American Machinist

April 25, 1934

Electric Locomotives in the Back Shop

SINCE steam locomotives have been supplemented by other forms of motive power the railroad shop man has been obliged to enlarge his knowledge of mechanisms to handle the new problems that have been forced upon him. And on the Pennsylvania Railroad system which, in addition to steam, now employs electric locomotives, multiple unit local service and internal combustion motor rail cars, his work is more varied than ever.

Both the electric locomotives and the rail cars have much in common so far as electrical maintenance is concerned. Commutator work is much alike in both except as to the size of the units handled. Roller bearing maintenance is similar with the same exception as to size. And here it may be well to remark that roller bearings are not much of a maintenance problem. Occasional adjustment as to end play, usually done with washers of standard thickness or thinness, is about all they require as a rule until they wear to the rebuilding or replacement limit, and there seem to be no figures available as to how many miles of service this means.

Beginning with the newer type of electric locomotive the mechanical maintenance work is largely confined to the plain bearings that support the quills or sleeves that surround the driving axles, in the motor frames and to the commutators of the motors. Side and connecting rod work, crossheads, guides, cylinders, pistons and rods, not to mention valve motion work, can all be forgotten.

Beginning with the bearing shells for the quills which are approximately 15 in. inside diameter and about an inch thick, we find a rather interesting boring mill job. Some of the shells are shown in Fig. 1 and the boring mill fixture in Fig. 2.

The fixture is a shell with heavy rings welded on each end. The upper ring has two holes for the lifting eyes for handling the fixture. On the boring mill table is a plate with grooves cut in the face. The lower end of the fixture has a projecting ring that fits these grooves. With the fixture in the central position the bearing surface is bored on the concentric part of the shell. Moving the fixture into another groove, the relief in the crown of the shell is cut away while with the fixture in the opposite groove the boring tool cuts away the relief at the sides of the shell.

The form at *A*, Fig. 1, is for spreading the shells before putting them into the motor frames. They are opened about $\frac{1}{8}$ in. and then forced into their seats.

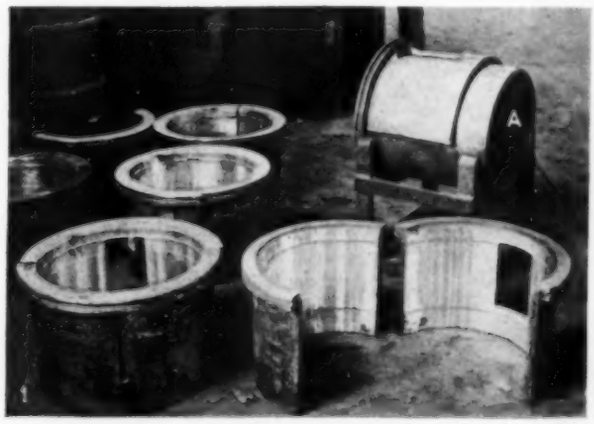


Fig. 1 — Bearing shells that support the motors on the quills

The main mechanical work on the electric motors is on the armature commutators. These are turned true, when worn, in a lathe as in Fig. 3. Any necessary banding with wire is done in the same lathe, the sheaves or grooved wheels on the carriage at *A* guiding the wire as the carriage is fed along.

An adjoining lathe carries the device in Fig. 4 for relieving or undercutting the mica insulation between the commutator segments. This is an independent unit with its own motor for driving the feed screw that moves the head and the cutting mechanism along the bed. The standard electric drill mounted on the vertical slide drives the milling or slitting saw *A* through suitable gearing. With the cutter set at the proper height the saw is fed along the commutator and undercuts the insulation.

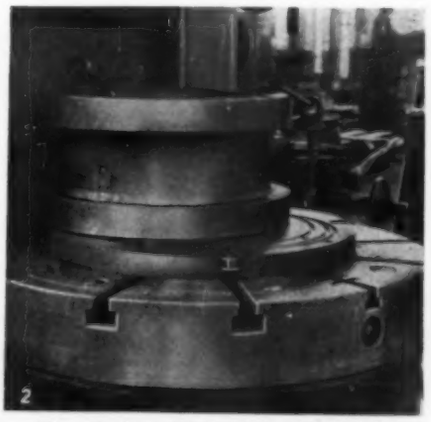


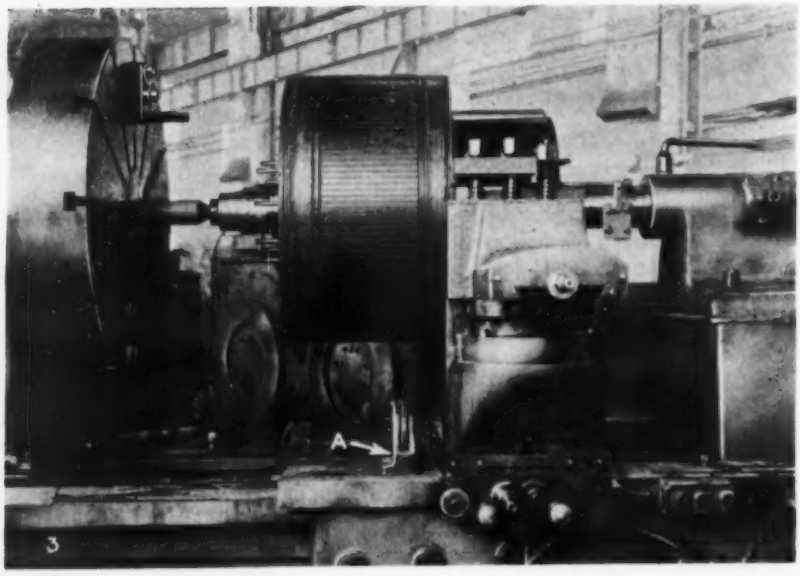
Fig. 2—Special boring mill chuck for securing proper clearances

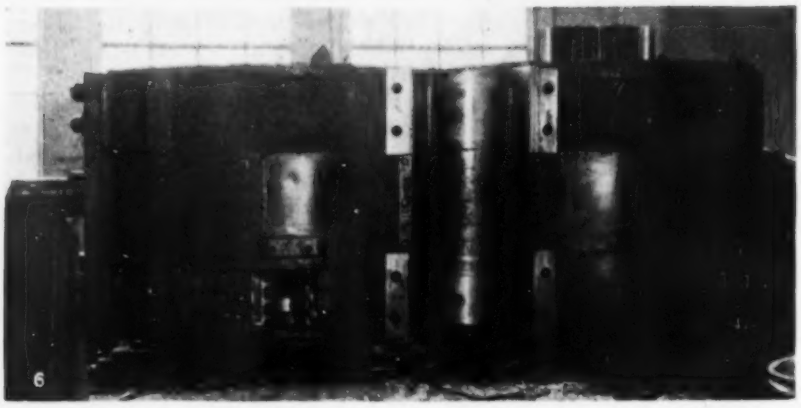
The final finishing of the commutators is done in a machine built especially for the purpose and illustrated in Fig. 5. The sling or carrying frame bolts to the ends of the armature unit and enables it to be handled easily and safely. The finishing machine has its own motor, seen at the rear, the whole unit being built up on heavy I-beams as a base with the upper parts welded to it. The armature is supported in its own bearings, the front bearing being inside the commutator. The commutator is finished by letting it run in with special brushes held in position by the holders shown. There are several sets of these holders.

Before running-in, the burrs left from undercutting the insulation are removed by a tool in the special tool rest at *A*, Fig. 5. Then the armature is covered with the shield *B*, shown in the background and run at normal speed with the brushes in contact until the desired surface is obtained.

It is interesting to note that these armatures are 37.5 in. in diameter, and weigh 5,650 lb. each. The commutator is 27.5 in. in diameter.

Fig. 3—Large armature (37.5 in.) in lathe for truing commutator. Pulleys on carriage guide banding wire when necessary. Fig. 5—Special machine for finishing and running-in commutators before assembling in motor with frame for lifting armature. Fig. 6—Underside of one of the twin motors showing bearing shells in place. Motor is mounted on special stand





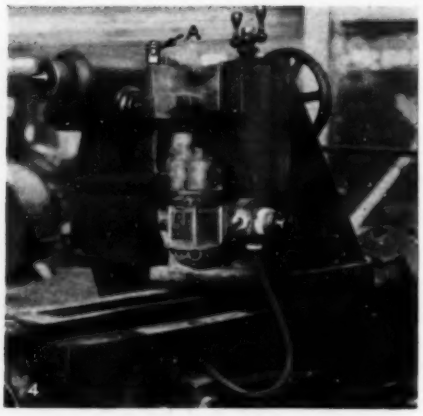


Fig. 4—Self-contained and motor-driven attachment by which the insulation between commutator segments can be undercut

The motors on these locomotives are built in pairs, each pair being mounted on one axle and driving one set of wheels. This can be seen in Figs. 8 and 9. The bottom, or lower side of a pair of motors, is seen in Fig. 6 with both bearing shells in place in the center between the pinion shafts. Such a pair of motors weigh approximately 32,000 lb.

Following automobile practice these motors are mounted on stands for assembling and for adjustments, as in Fig. 7. The weight, however, as compared with an automobile or truck motor necessitates the use of the worm gear for turning and holding the motor. The uprights or pedestals are of welded steel plates.

A good general idea of the running gear, or wheeling, of one of these large electric locomotives can be seen in Fig. 8. Every axle has roller bearings which have given long and satisfactory service. The large bearings on the ends of the three driving axles fit into the pedestal jaws as in steam locomotives. The absence of reciprocating applications of power as in the steam locomotive materially reduces the problem of maintenance at this point.

A close-up of one driving axle is seen in Fig. 9. This shows the quill that surrounds the driving axle which is being held central by the jack under the center. This quill is carried by the bearings in the motor frames previously shown while the axle inside it carries the weight of the locomotive.

The pinions of both motors mesh in the large gear shown inside the driving wheel. This gear is flexibly mounted with relation to the wheels as can be seen by the connections between the spokes. The clearance between the quill and axle permits the axle to move 2 in. vertically when necessary, to compensate for inequalities in the track, as in

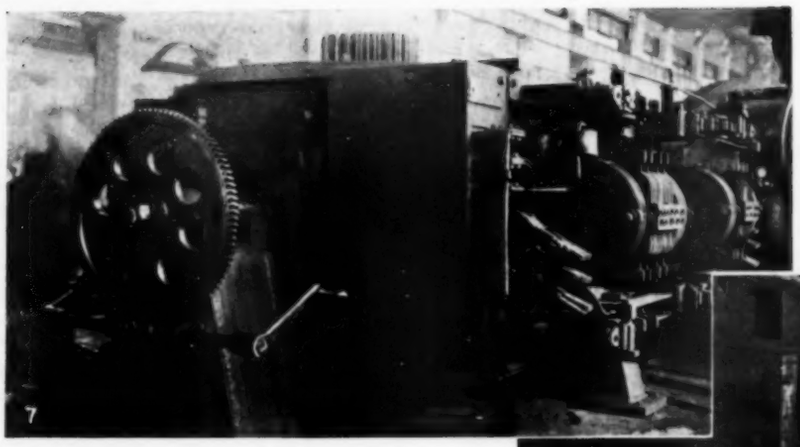


Fig. 7—Another view of motors showing the special stand used in overhauling. The complete motor weighs 32,000 pounds

Fig. 8—Running gear of electric locomotive ready for motors and upper works. Note drive gears on alternate sides

going over frogs and switches. Fig. 9 also shows the lower half of the quill bearing beneath the axle, ready to be bolted into place.

It will be noted that each axle is driven from but one end, both motors driving the same gear inside the drivers. These gears, incidentally, have their teeth ground with a formed wheel on one of the largest commercial gear tooth grinders built. Looking back to Fig. 8 it will be seen that each alternate axle is driven from the opposite end. As seen in the illustration the two end axles are driven from the right hand end while the center axle is driven from the left.

Another interesting feature shown in Fig. 8 is the type of bearing used to connect the center bearing of the truck with the frame or body of the locomotive. This hollow square fits up into corresponding bearing surfaces in the frame and provides for vertical movement as well as positive fore and aft location.

Final assembly, or the mounting of the body of the locomotive on the trucks, is seen in Fig. 10 where the body is poised on the crane ready for the final lowering into position. This resembles the similar operation with a steam locomotive. With the latter, however, much more remains to be done after the frame is in place, such as putting on connecting and side rods, valve motion and the like. The electric locomotive adds new problems for the shop but the mechanical work is simplified, and maintenance costs seem to be considerably reduced.

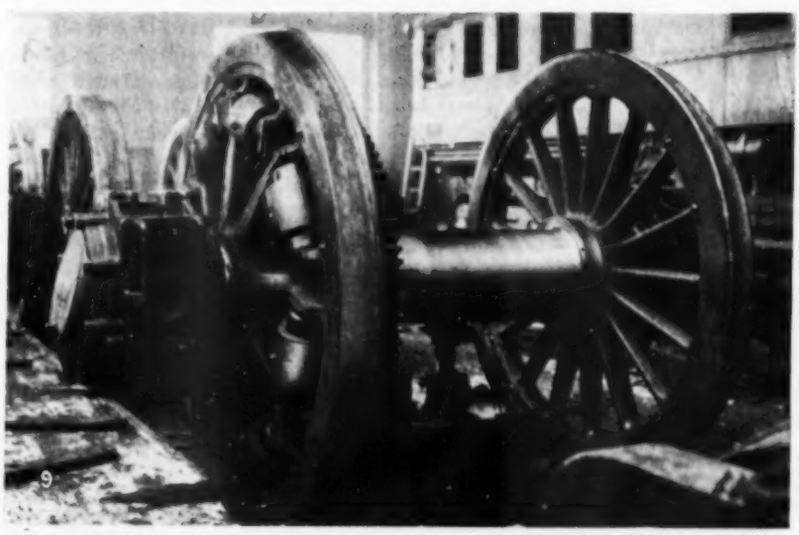


Fig. 9—Detail of driving wheels showing spring-mounted gear, motor bearing quill supported by jack and main roller bearing. Fig. 10—Lowering complete upper works on locomotive running gear. This shows frame pedestal jaws over the outside roller bearings

Will it Pay to Modernize Railroad Repair Shops?

Although it seems obvious that modernization of railroad repair shop equipment would pay, the type of operation performed and the fact that practically all of the railroad managements hesitate to do any modernizing throw enough doubt on the situation to warrant the kind of sample shop study which has been made under the direction of the Federal Coordinator of Transportation

"WHAT'S WRONG With the Railroad Shops?" was the title of a series of articles that appeared in *American Machinist* a dozen years ago. That series was based on a field survey made by a prominent consulting engineer, and it attracted much attention from railroad executives. One even rose stoutly to the defense of the shops, condemned the *American Machinist* as a special pleader for the machine tool industry, and then went quietly but firmly to work overhauling his own shops and bringing them up to a much higher state of efficiency and modernity.

In the *American Machinist* study no attempt was made to arrive at actual figures on cost reductions possible with better equipment. The investigator confined himself to a report on existing methods and equipment, and to the raising of questions as to the need for change. Ever since then there has been a crying need for a study that would reduce the problem to a dollars-and-cents basis. The railroad administrative heads should have done the job themselves but tradition was too strong, the tradition that the repair shop is a necessary evil in railroading and that it must be operated with the lowest possible expenditure for facilities. Any outside agency would probably have failed because hearty cooperation from the railroad men would have been essential to success, and some of them would surely have been suspicious that an attempt was being made to "show them up."

And so the matter has gone by default until the appointment of the Federal Coordinator of Transportation on June 16 of last year introduced a new factor. Enough of the expenditure for the operation of a railroad goes for maintenance of locomotives to make a reduction in that item of interest to anyone who is concerned with putting the railroads on a paying basis. It was not long, therefore, before Coordinator Eastman, through his Section of Purchases, initiated a study of the possibilities for modernizing the equipment in railroad locomotive and car shops, for the purpose of securing economy in the actual operation of such shops, and in the cost of running repairs of the equipment.

For obvious reasons it has not been possible to make a complete study of all railroad shops. At the request of the Coordinator, and with the consent of one of the larger railroads, a brief survey has been made of one shop of fairly good size, and containing equipment which is perhaps slightly better than average as to age and condition. The actual field work on this survey was conducted by the representatives of the large machine tool builders, under the auspices of the National Machine Tool Builders Association. This field work has now been completed, and it is expected that a final report on this particular shop has by this time been made to the Coordinator.

In the course of the field work, a number of possibilities for economy were clearly disclosed, and will be brought out in the final report. The primary purpose of this report was to show, in the case of an average railroad shop, whether expenditure of money for new equipment and tools will be justified by economy in operation and in the condition of equipment, and to estimate as closely as possible the length of time required to recover the expenditure through resulting economies. The field work included a detailed study of each type of machine tool used in the shop, and a general study of accessory equipment, including that used for handling materials. Each type of machine was studied by a thoroughly competent representative of a company manufacturing that type, and the results of each of the different studies were compiled and coordinated by a competent man who is not a representative of any machine tool manufacturer. While the final results have not been made public, we are informed that the findings indicate possibilities for very substantial economies in the production of locomotive parts. In appraising these economies, the quantity of production used as a basis for figures was that of the year 1933. Any increase in production over the 1933 figures would show much greater proportionate savings.

While no attempt has yet been made to estimate the possible savings in running repairs in detail, it seems probable that such savings may be almost as important as the savings in actual shop operations. Quality and accuracy of workmanship made possible through the use of the most modern tools and equipment will result in better service and longer wear, and should result in a material decrease in the amount of time during which a locomotive must be kept out of service. While this possibility has never been demonstrated on a national scale, it has been conclusively demonstrated by several individual railroads, which within the past ten years have been able to modernize their shop equipment. In one instance, the average annual shop time per locomotive was reduced nearly 50 per cent, and a noticeable reduction was made in the cost of running repairs, both directly and in the amount of time the locomotives were out of service for such repairs.

Standardization is Vital

The question of standardization and simplification of locomotive and car parts is of major importance in any scheme for reducing the cost of shop and running repairs. Practically all the railroads have established standards of their own for each item, but in the majority of cases it seems probable that the number of different sizes or types of

a given item could be reduced to great advantage, and without damage to the value of those items in use. It is of course impossible to plan the operation of a locomotive shop in the same way that the operation of a production shop could be planned. At the same time a very considerable amount of improvement seems possible in the way of establishing regular schedules for repairing locomotives and cars, to a much greater extent than has yet been accomplished by the railroads as a whole. The Section of Car Pooling of the Coordinator's organization has been making an extensive study of this subject, in cooperation with an Advisory Committee of railroad officers, and will probably make a report on the subject in the near future. Their preliminary studies indicate that there is plenty of room for improvement in this field.

Handling Equipment

The survey above mentioned did not go into detail as regards the use of materials handling equipment, or the application of new types of equipment developed during recent years. This field offers great possibilities for economy. Certain railroads have found, for example, that the use of mobile floor equipment has resulted in saving the entire purchase price in as short a time as six months. The Coordinator's office hopes to conduct a further study in this field as soon as possible.

The matter of standardization and simplification, particularly the latter, will be of even greater importance if any move is made to consolidate shop facilities, either on individual railroads or between two or more railroads. This subject is being studied at present by the Western Regional Director of the Coordinator's organization, in cooperation with representatives of the Western Regional Coordinating Committee of the railroads, but no recommendations have yet been worked out. It seems probable that a certain amount of such consolidation would result in economy to all the roads, provided that the present program of the Coordinator in connection with standardization and simplification is carried forward as planned.

The Coordinator's office is working continuously with the Purchases and Stores Division and with the American Railway Engineering Association, in its effort to promote the development, adoption, and effective use of sound standards for items common to all roads. Some progress has already been made along this line, but it is negligible when compared with the opportunities now recognized in this field. There are literally hundreds of items which are made in a great range and diversification of types and dimensions for different railroads, and which could be made in a small fraction of the present variety, with resulting economy to everyone concerned. Such economy would in some cases be reflected in the first cost of the items, and even more obviously in the cost of carrying inventories, handling and distributing material, and actually applying the material in track or equipment. This is one of the most important phases of the work of the Section of Purchases at the present time.

Continue the Coordinator

So great are the possibilities for good in the program mapped out by the Coordinator in his first year of work that it is to be hoped that President Roosevelt will continue the appointment when it expires the middle of June. Harassed as they are by the inherited handicaps of bad financial management by their predecessors, by uncontrolled competition, by traditional jealousies on the part of their purchasing, engineering and mechanical departments, the present heads of the railroads may be forgiven for part, at least, of their delay in tackling the shop equipment modernization problem. But the very fact that they are confronted with so many other troubles makes it imperative that they be reminded of the necessity for modern facilities in their repair shops and the reductions in expense to be expected from the investment involved.

Clear evidence of the high cost of lack of standardization in locomotives. Millions of dollars worth of spare parts are stored in and outside of back shops all over the country

Making and Repairing Crossheads—I

CROSSHEAD repair and replacement is an important factor in locomotive maintenance. Methods vary widely acording to the volume of work handled, the number of types of crossheads in use on the road or division, the machine equipment available and on the individuality of the men in charge of the work. A brief résumé of crosshead practices has been tabulated below to give an idea of the way in which methods vary. Other practices will be given in detail.

	Yes	No
Shoes fitted to individual crossheads	9	2
Standard shoes used without special fitting	5	6
Shoes planed after bolting to crosshead	6	5
Shoes babbitted before assembling to crossheal	7	2
New babbitt on worn shoes in place	1	7
Babbitt machined after casting in place	4	5
Crosshead shoes made of brass	2	9
Crosshead and shoes milled instead of planed	4	7

Milling is now done in a fair percentage of shops, one of these being the road using brass shoes. In most cases, however, the planer or shaper still prevails. Standardization of shoes also varies, a few shops carrying them in stock ready to be put in place, others having them rough machined but needing a final finish, both as to fit in crosshead, on guide and the bolt holes. Just how far standardization can be carried profitably depends largely on individual conditions. Work on running repairs frequently differs from methods used in the back shop on a general overhaul.

Differences in practice between the two kinds of repairs are typified by the following:

When the crosshead is not disconnected the shoe is put in place, the holes scribed through the holes in the crosshead and drilled from both sides, then reamed. Under the same conditions new shoes are planed before bolting into place. In roundhouse work the shoes are removed from crosshead, sent to the back shop, babbitted and replaned to fit the guides. Some railways cast new babbitt on a worn shoe without removing it from the crosshead. A few shops use jigs for drilling bolt holes in crossheads and shoes but many utilize the hole in crosshead to drill holes in the shoes. About as many use babbitt lining without machining as plane the babbitt before putting it into service, so that there is evidently not much difference as to the service given. When planed with shoes in place it is customary to mount the crosshead on a mandrel that represents the piston rod and support this, parallel to the table, on V-blocks.

Some roads keep the guides of standard width by welding on sufficient material to allow for planing to size. Others plane if necessary to a narrower width and make the new shoes fit the narrowed guide. The first method permits shoes to be planed to standard width and kept in stock to save time in replacement.

It is also interesting to note the number of roads which use the babbitt liners as cast, eliminating the machining of the sliding surfaces.

One large railway system uses combination fixtures for planing crosshead shoes, and driving box shoes and wedges, as shown in Fig. 1. Four crosshead shoes are in place utilizing five of the holding blocks seen in detail at *A*. These are castings with a substantial base, of uniform height and carrying tool steel

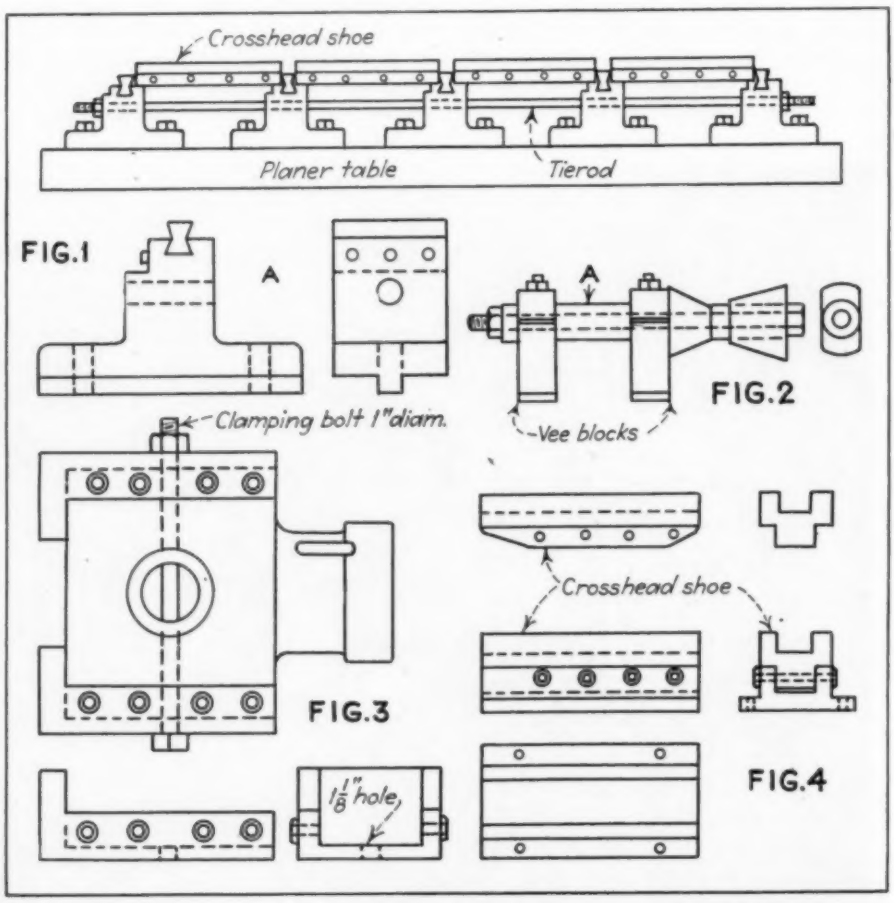


Fig. 1—Planer fixture for "string" planing crosshead shoes. Holding blocks shown in detail. Fig. 2—Crossheads are aligned by bore for planing shoes. Fig. 3—Simple drill jig for crosshead bolt holes. Fig. 4—Shoes are also drilled in a plain jig

gripping jaws at the top. These jaws are of a double dovetail section, the upper portion having diamond shaped serrations and sharp corners for biting into the work. They also carry three hardened steel points below the straight grip. These points are for planing driving box shoes and wedges.

As can be seen, the crosshead shoes are gripped by the long drawbolt which pulls both work and gripping blocks together, equalizing the grip automatically. All but the block on one end is left just loose enough to slide under the pull of the drawbolt and then made tight on the table. If too loose on the table the block and work might rise enough to prevent being drawn down into perfect alignment and so affect the accuracy of the set-up.

The fixture in Fig. 2 is for aligning the crosshead square with the cross or rod-pin hole while planing for the shoe fits. The supporting mandrel *A* is as large as possible, and hollow to accommodate a drawbolt through the center. The mandrel is supported on V-blocks and carries two centering cones as shown. These merely align the crosshead with the pin hole, support against the planing tool being provided by suitable blocks or jacks.

Bolt holes in the crosshead are drilled in the jigs seen in Fig. 3. These are simply channels with drill bushings on each side and an end piece for locating them as shown. The jig for the shoes is also a channel but has flanges for bolting to an angle plate or the side of a radial drill table. The simplicity of the design is seen in Fig. 4.

On one road all crossheads are painted with whiting and wood alcohol after they come from the cleaning tanks, just as is done with connecting and side rods. This shows up minute cracks that are invisible to the eye as enough oil will work out of the cracks to discolor the whiting. The old shoes are then removed for babbitting. When brass shoes are used they are milled to gage for the

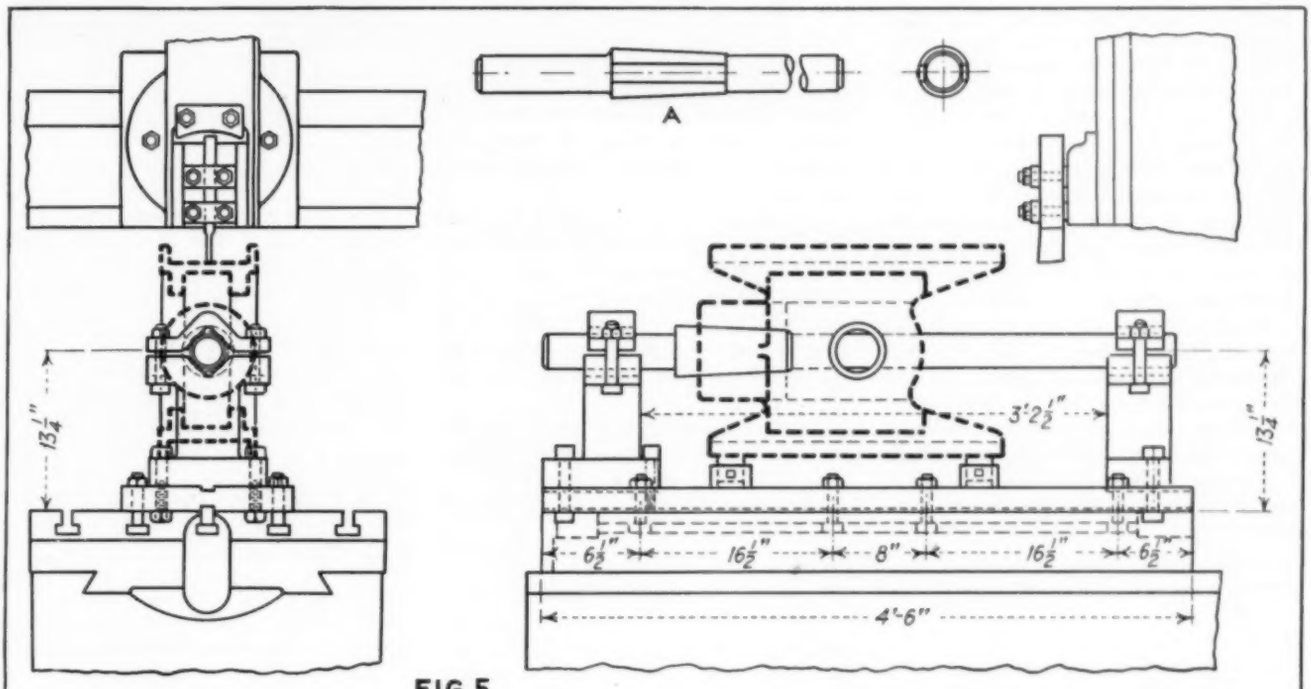


FIG.5

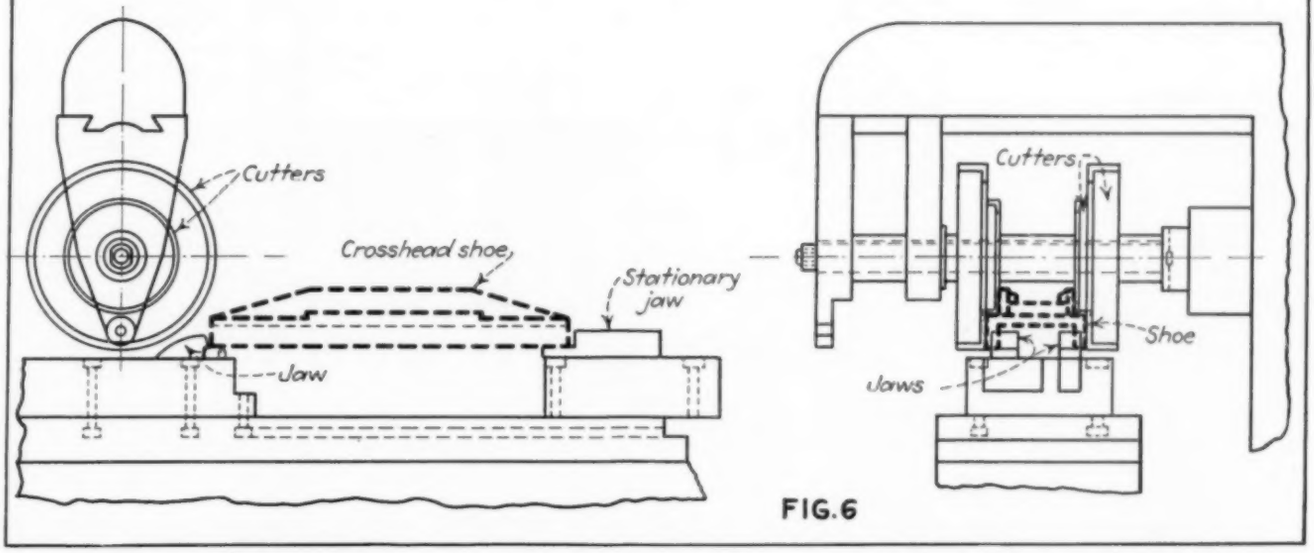


FIG.6

Fig. 5—Fixture for holding crosshead for planing. Work is centered by piston rod taper. Mandrels are made from old piston rods. Fig. 6—Bronze shoes are milled, using side cutters 16 in. in diameter

crosshead fit and for outside dimensions. They are then drilled and reamed to suit the crosshead, the operator fitting the bolts to take care of holes that have been enlarged by the working of bolts. The fitter has a supply of bolts varying by $\frac{1}{32}$ in. and all holes are reamed to 32nds, to permit the use of these bolts. This somewhat resembles the selection of pistons to suit cylinder bores, in automobile practice.

Planing Crossheads

Crossheads are machined on a crank planer while supported on a mandrel that is lined up on V-blocks. The crosshead shoes are planed to fit the guides. These mandrels are made from scrap piston rods as at *A*, Fig. 5, these being made to fit all types of crossheads. The operation is shown in Fig. 5.

This same road mills its bronze crosshead shoes for the crosshead fit using the set-up in Fig. 6. The method of holding the shoes, by means of air-operated jaws is shown. Gang cutters are used, the large side cutters being 16 in. in diameter. The arbor is well supported each side of the cutters.

An up-to-date method of machining and checking both new and reclaimed crossheads is shown in Figs. 7 and 8. New crossheads are first rough machined to relieve the stresses in the casting itself. The shoe fit surfaces are then finish milled at one setting on a double-spindle horizontal Hydromatic machine, hardened gages being used to check the dimensions.

The crosshead is then placed in a box jig that is centered on the table of a Bullard mill. This fixture has removable guides that fit snugly into the channels that hold the shoes. With the crosshead lined up by the shoe fits the piston rod hole is finish bored to the proper size and taper. The rod pin hole is also bored on the same machine in a similar fixture, both of which insure alignment of the various fits.

After machining the crosshead is put on the inspection table in Fig. 7. This table is surfaced square with a central plug that locates the piston rod hole. A large square checks the alignment of the shoe fit surfaces with the piston rod hole, as shown. Then a plug gage is put in the cross hole with the ends extending beyond the body of the crosshead. A surface gage on the table, not shown, makes it easy to check the squareness of this hole with the piston rod hole.

Crosshead shoes are milled for both the crosshead and guide fit and are carried in stock ready to apply when needed. The holes are drilled through an ordinary plate jig that is made in two sections so that it can be used for drilling both the crosshead and the shoe.

When a locomotive comes in for general repairs the crosshead is first checked for squareness and alignment on the plate shown in Fig. 7. If it has distorted or is out of square or worn in any way, it is built up by electric welding so that these portions can be machined to size. The fixture for holding the crosshead for re-finishing on the crosshead shoe fits is seen in Fig. 8.

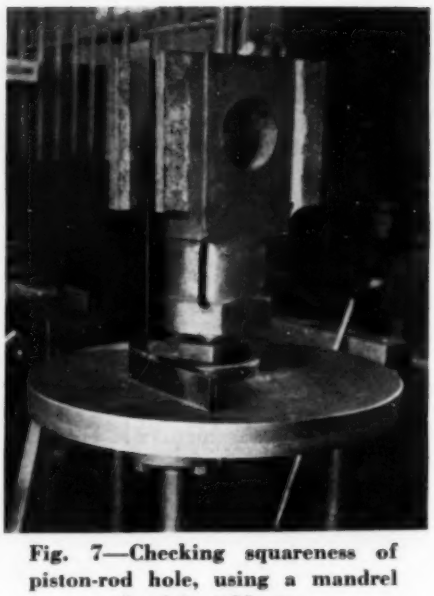


Fig. 7—Checking squareness of piston-rod hole, using a mandrel fixed in table top

This fixture consists of a substantial angle plate *A* with a taper plug *B* that has a good bearing in the plate and can be turned in it to bring either side of the crosshead up under the planer or shaper tool. The plug goes inside expanding sleeves that fit various crossheads. The end view of the angle plate

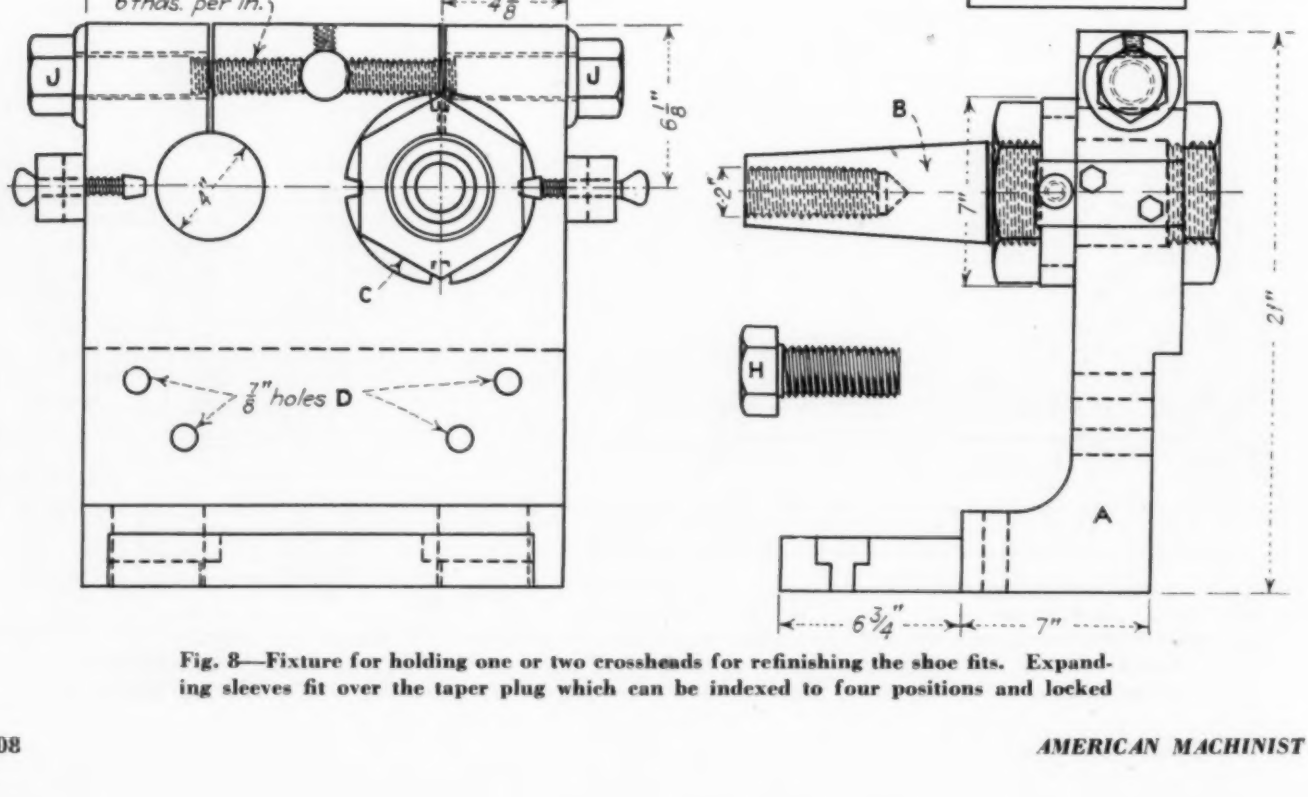


Fig. 8—Fixture for holding one or two crossheads for refinishing the shoe fits. Expanding sleeves fit over the taper plug which can be indexed to four positions and locked

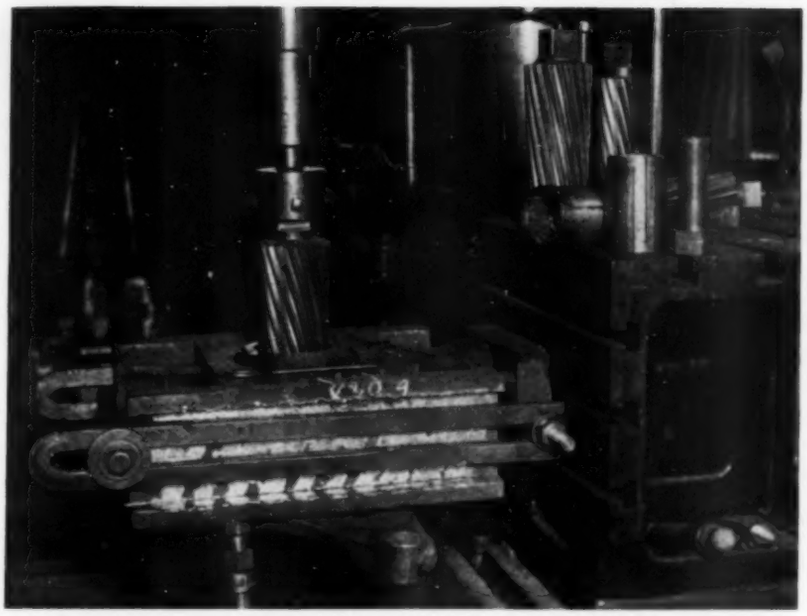


Fig. 9—Reaming the crosshead pin fit with left-hand reamer. This also shows the expanding sleeves used in the fixture in Fig. 8

shows the indexing plate *C* which permits the plug to be indexed in four positions. The ⅞-in. holes at *D* permit inspection of the lower side of the crossheads. As shown, the angle plate is designed to carry two taper plugs and handle two crossheads at once, although but one plug is in place. The plugs are clamped by bolts *J*.

If it has been found that the pin has been working in the crosshead, the taper fit bearings are reamed with a left-hand spiral reamer as in Fig. 9, this being done under a radial drill. The crosshead is mounted on one of the taper expanding sleeves shown on the table. These are pulled into place by the bolt shown in a similar way as shown in Fig. 8. The crosshead is held by the fixture being bolted squarely to the table and the outer end supported by the jack. This fixture insures alignment between pin hole and the piston rod fit.

How Smooth Cylinders Discussion

M. P. DALTON
Kemsing, Sevenoaks, England

C. G. Williams gave some interesting facts (*AM*—Vol. 78, page 16). His facts are, no doubt, right but his logic is doubtful. Without pretending to decide what the facts mean, it may be pointed out that the longer life or better performance may, in each case, be due to more perfect shape and not to perfect finish. From a long series of observations, recorded elsewhere, I had long ago concluded that the factor in cylinder life which counts most is the original accuracy of the circular shapes concerned. This agrees with Mr. Williams' observations. A reamer will give a more truly circular shape than the ordinary turned finish; the grinder is better still and the hone is best.

Saving Time in the Car Shop

CHARLES F. HENRY

REPAINTING baggage racks and their brackets as well as other small parts in a passenger car is a puttering job, largely because of the handling. Spray painting does not help as much as might be expected because of the many small, round surfaces that are not easy to get at.

The problem has been solved in one large shop of the Pennsylvania Railroad by building the circular paint rack shown in Fig. 1. The parts to be painted are stored in the vertical racks shown behind the turntable. The operator works with his back to the window, the cover *A* being removed to expose the upper end of the paint tank. Taking the parts from the storage rack he lowers them into the paint tank with a convenient hook, raises them and lets them drain a few seconds, and hangs them on the racks in front of him and over the turntable. The long baggage rack sections are hung on the upper arms while the brackets are hung on the lower cross arms as shown.

Another space saving rack in the same shop holds all the window sashes of a passenger car at once. Only eight sashes are in place in Fig. 2 but the remaining leaves or frames will hold the rest.

The sashes are held in place by easily operated flat springs and catches. With the racks filled with window sash all necessary operations can be performed on them. They can have new glass put in place, any necessary reglazing can be done, they can have paint or varnish removed or given a new coat, or both, as may be necessary. The sashes remain in the rack until all work has been done when they can go to the plain vertical storage racks or direct to the car.

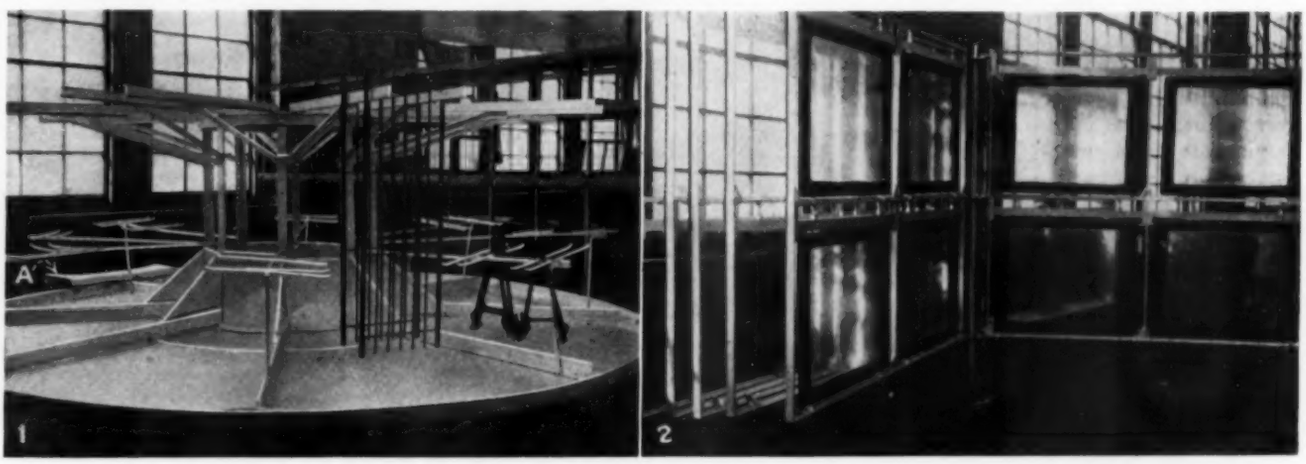


Fig. 1—Rack for freshly painted baggage racks. Fig. 2—All repairs on window sash are made while in this rack

Modern Milling in Railroad Shops

Examples of the time- and cost-saving operations possible with up-to-date milling machines of various types

MILLING is making steady advances as a standard operation in railroad shops. Its adoption, however, involves several problems that must be carefully considered. The lot size is usually small as compared with lots in manufacturing plants. Tool and cutter cost must therefore be kept at a minimum, but this does not mean cutters should be purchased on the basis of first cost only. The kind of work produced is as important a factor as cutter life and maintenance in determining the real cost of the cutters and of the method.

Another factor is the selection of the parts and the materials to be milled. One reason given for not adopting milling in driving boxes and other parts made of steel castings, is that hard spots and sand inclusions shorten the life of cutters. This difficulty, according to some shop men, exists largely because the P.A. insists on the lowest price possible on castings, entirely overlooking the effect on the total cost of the parts to be made. An additional dollar on a casting would frequently save many dollars in the finished part by permitting higher speeds and reducing maintenance cost on cutters. Poor castings have been responsible for the abandonment of milling in more than one shop because cutter cost was excessive.

Many railroads, however, are appreciating the opportunities for savings on such jobs as shoes and wedges, driving boxes, crossheads and the like, and have installed milling machines of various makes and types to handle such work. They are also realizing that the greatest efficiency comes from concentrating work at a few points in order to machine parts in larger lots. Even in such cases the requirements rarely make continuous operation possible and limit the amount that can be spent for fixtures and cutters. With all the limitations, however, great strides have been made as will be seen from the examples shown.

Milling machines have been used in railroad shops for many years. We have seen an old knee type for which the foreman boasted 50 years of service. This machine, and all others in the early days, was for toolroom work. Millers for regular work came considerably later, but few of the most recent machines have found their way into railroad shops, about 80 per cent of those in use having been installed prior to 1920. Many of the milling machines of more than 12 years ago are doing good work, they are only obsolete because of the greatly improved machines now available. Recent installations have demonstrated that the new models can earn from 20 to 30 per cent net annual return on their cost. In view of the recent statement that the cost of locomotive repairs is approximately 25 per cent of the total expenses of a railroad, the importance of modern machine equipment becomes apparent.

Since nothing is so convincing as examples from actual practice, we are showing a number of set-ups of typical railroad shop jobs.

The first, Fig. 1, is a driving box wedge, held in an air clamping fixture on a Cincinnati Hydromatic machine. This fixture is built in units and can handle quite a variety of work. The combination of fixture and machine has reduced the floor-to-floor time for this particular wedge from 34 min. to 8 min., a reduction of 77 per cent. In addition, the floor space occupied has been reduced 90 per cent.

Two other similar operations are seen in Figs. 2 and 3, both using Ingersoll machines. The first is milling the plain shoes, while the tapers are being milled in Fig. 3. The same fixtures and cutters are used in both cases. The jack screws beneath the castings are adjusted to give the proper angle. In this case the work is done on a planer type Ingersoll miller. The floor to floor time is given as 3 min. for the bronze shoes and from 4 to 5 min. for cast iron. Here the work is

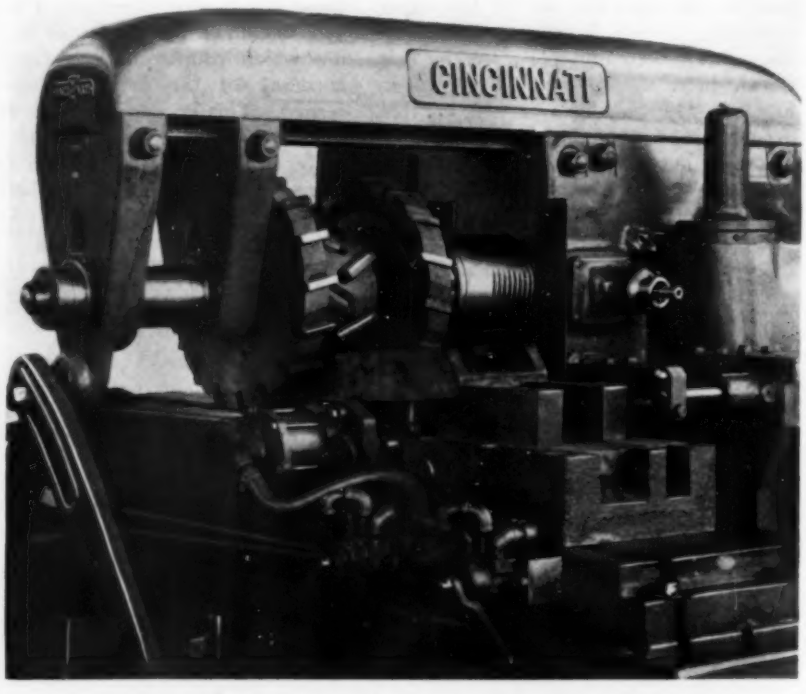
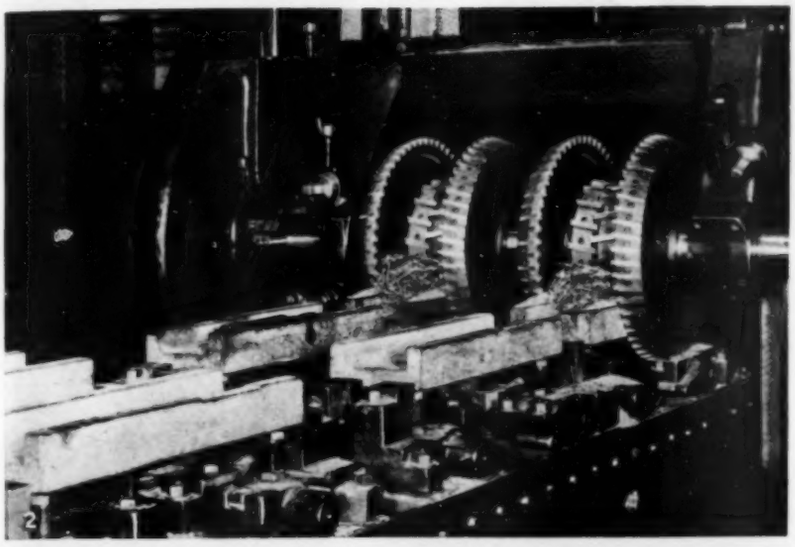
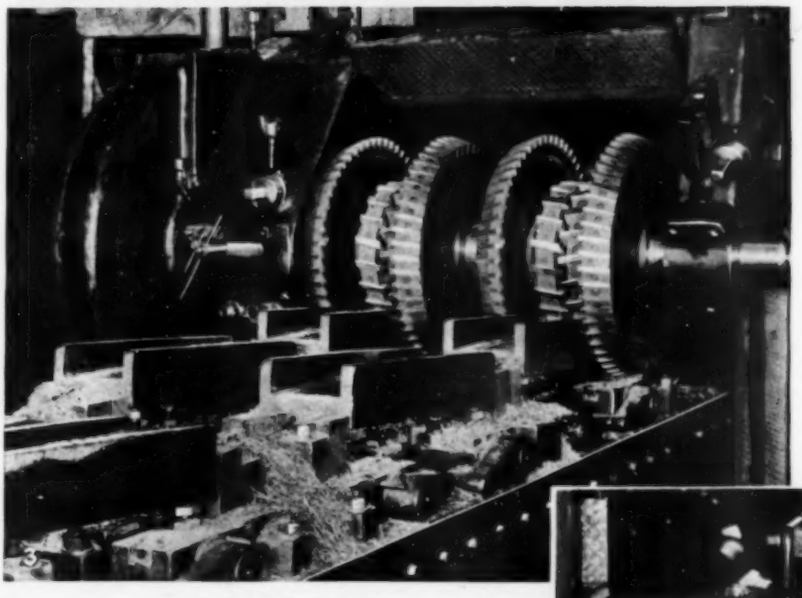


Fig. 1—Air clamping fixture for holding driving box shoes and wedges on milling machine





Figs. 2 and 3—Shoe and wedge work on Ingersoll planer-type miller. Fixtures permit tilting of work to proper angle when milling wedges. Note large cutters used

gauged as in the planer, the method depending on the number to be machined, per month or per year.

Another set-up for milling shoes and wedges is shown in Fig. 4, this being a Kearney and Trecker Duplex machine. The material is 80-10-10 bronze. Railroad men consider this a rather difficult job and some have had trouble getting cutters that were satisfactory on the bronze used. The shoe finishes up to an overall width of 9 in., the channel being 7 in. wide and 2¼ in. deep. The overall length is 24 in. One difficulty is that the shoes must be held by the ends, which limits the clamping pressure that can be applied.

The large cutters are 11½ in. in diameter and the channeling cutter is 8 in., which gives a trifle over 70 ft. cutting speed for the small cutter and nearly 50 per cent more for the large outside cutters. Feeds were varied from 8.4 in. per min. to 13 in. but 10.5 in. was found most satisfactory with the fixture used. An emulsified lubricant is used. The metal removed varies from 3/16 to ¼ in. on a side, which can be reduced to ⅛ in. The floor-to-floor time is from 15 to 17 pieces per hr., or about three times that secured from an older machine. This job is also handled on a single column machine using the overarm and tie to support the other end.

Driving boxes are also milled by several methods. Single boxes are milled as in the Cincinnati Duplex Hydromatic seen in Fig. 5. The driving box is held on a substantial plate that can be rocked to give the proper angles to the sides. This machine has a special high-torque motor for elevating each head, to enable it to be quickly adjusted for different set-ups. In this case the driving box is milled complete in 90 min., or about one-quarter the time formerly taken. A set-up for milling worn driving boxes is seen in Fig. 6, where two boxes are milled at a single set-up. Only the sides, or shoe and wedge faces, are milled in this case. The time is 17 min., floor to floor.

By the Ingersoll method a driving box

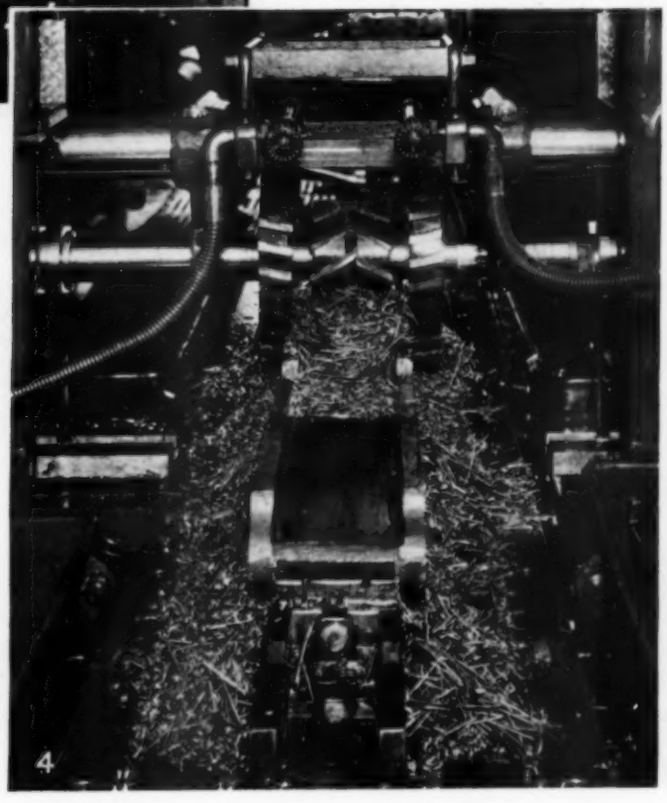


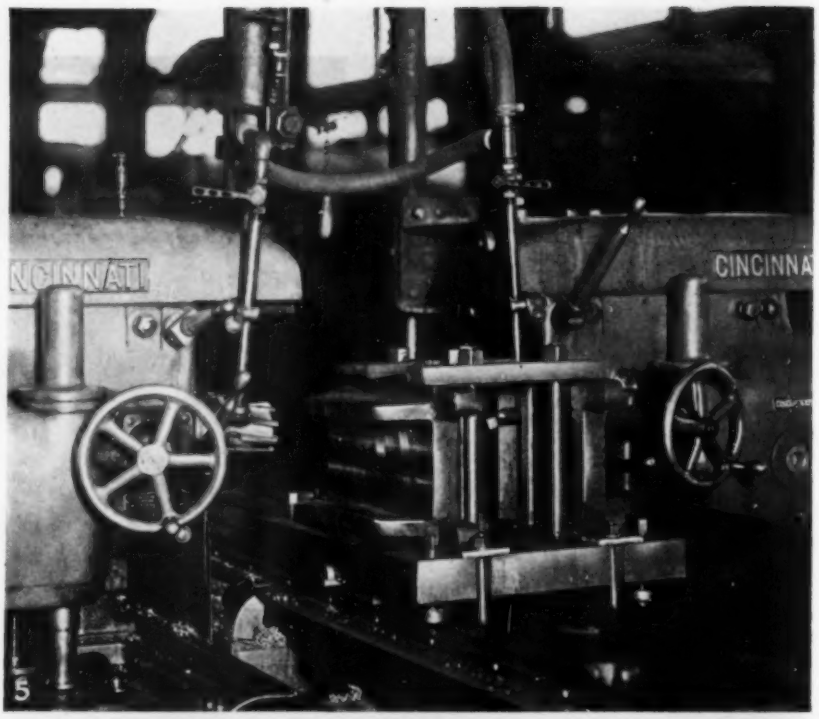
Fig. 4—Another set-up for similar work on a Kearney & Trecker double-head machine to mill bronze shoes

is milled complete in less than an hour. Three cutters, each on a separate spindle, are used, as shown in Fig. 7. In this set-up the boxes are arranged in pairs with a gap between. Time lost is inconsiderable because the rapid power traverse minimizes the time between the cuts. The machining is also split into two settings: in the first setting the shoe and wedge fits are milled with the side cutters, while the large sweep cutter mills the upper face. This setting takes 30 min. The boxes are then turned over and the other face milled in 20 min. for each box.

The angles on the wedge faces are secured by a combination of the table feed and the vertical feed of the side heads. These feeds can be so geared together as to give any desired taper without the use of formers or followers. When the boxes have bronze liners they are completed in 10 min. floor to floor; with steel liners it takes 15 min. Bronze liners are milled at 24 in. per min., while for steel the feed is cut to about 6 in. The handling time is, of course, the same in each case.

Crossheads and crosshead shoes also lend themselves to milling operations. A crosshead shoe is shown in Fig. 8, set up on the same machine as in Fig. 5. No special fixture is used, the shoe being held in a vise with the ends supported by a small screw jack, this being a temporary set up.

A complete crosshead and piston rod is milled by the Duplex Milwaukee-Mil, Fig. 9. The crossheads are manganese steel castings. The cutters are 4½ in. diam. with 10 teeth, the cut being 3/16 to 5/16 in. deep. Cutters run at 70 r.p.m., or above 80 ft. per min., with a feed of 10.5 in. Two passes are used as the channel is 6 in. wide and 2½ in. deep. The bottom part is usually milled first. A finishing cut of 1/64 in. is usu-



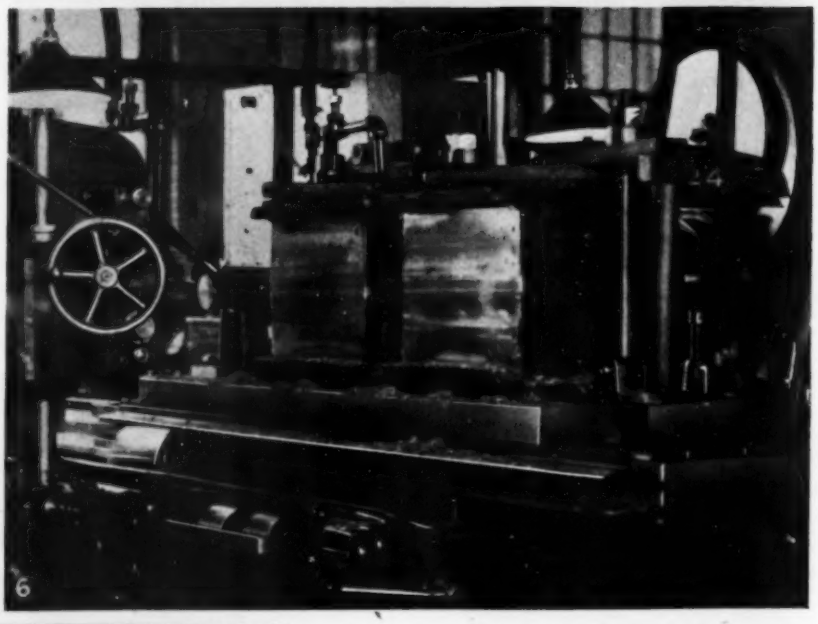


Fig. 5 and 6—Milling new driving boxes and also resurfacing boxes from a locomotive that is being overhauled. The base of the fixture can be tilted to get the proper angles on the side flanges

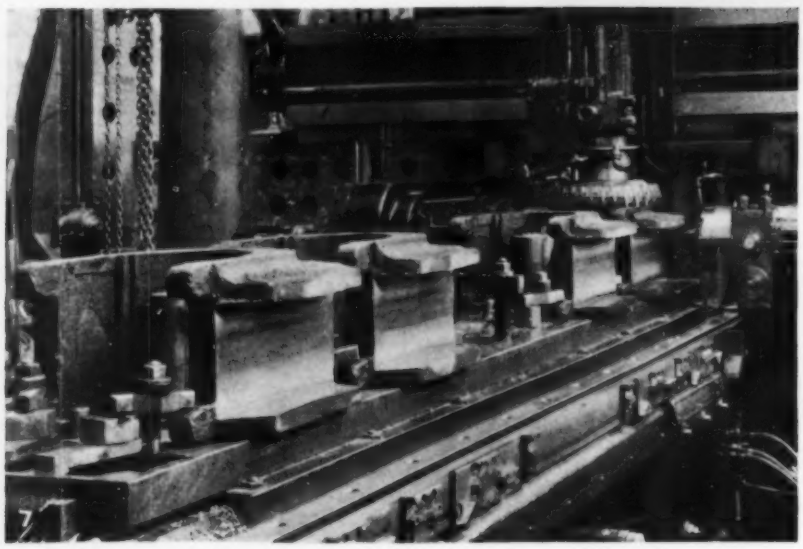
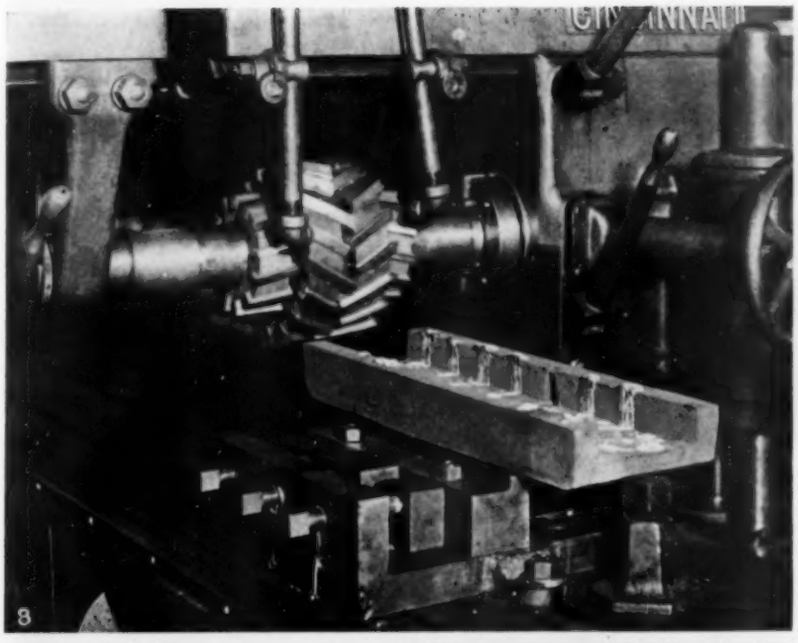


Fig. 7—This set-up includes a vertical spindle on the Ingersoll miller that machines the faces of boxes as well as the sides



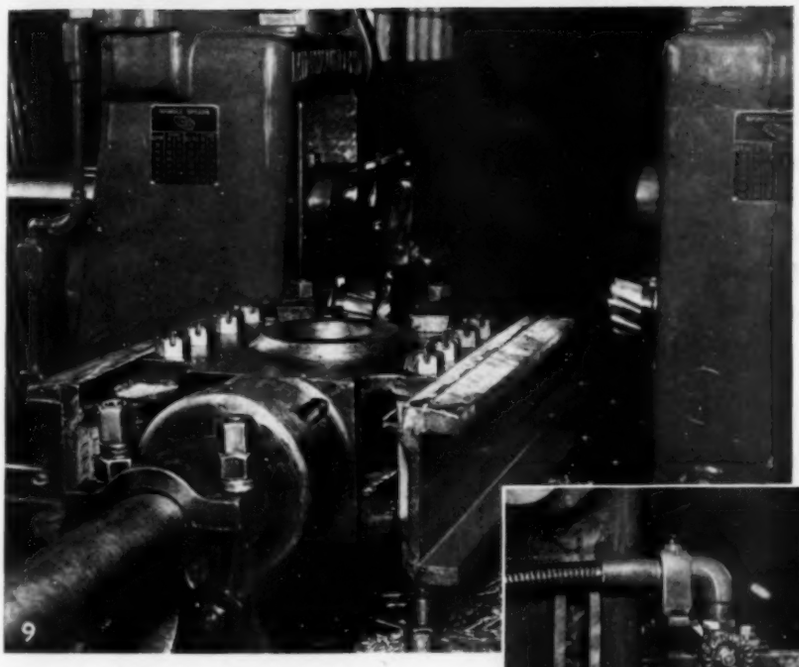


Fig. 8 and 9—Crossheads and crosshead shoes are also milled on various machines. The shoes have babbitt strips in place. Crosshead casting is of manganese steel and is milled with shoes in place

ally taken. The time for both cuts is from 45 to 50 min. per crosshead, a saving of over 50 per cent over the single spindle machine.

Crosshead guides also provide good chances for milling, this operation being a plain, surfacing cut on a Kearney & Trecker machine. The pair shown in Fig. 10 are 4x8x72 in. An 8-in. cutter with 18 teeth is used on each spindle and one side of two guides is milled at one setting. Cutting speed is from 50 to 60 ft. per min. with a $\frac{1}{8}$- to $\frac{1}{4}$-in. depth of cut at one pass and a feed of from 4.2 in. to 10.5 in., depending on the depth of cut. With this cut in heavy metal the cutter is inclined to be the limiting factor, so that the more rigid the machine the better the results.

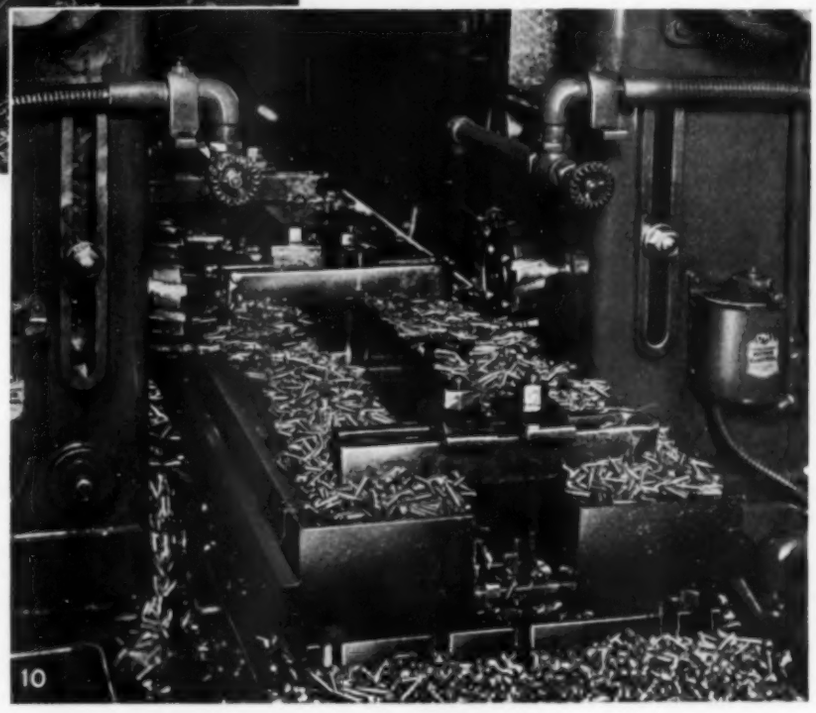


Fig. 10—A pair of crosshead guides is being milled at once. Cutting speed ranges from 50 to 60 f.p.m. and feeds from 4 to 10 in.

Blanks for Drawn Work

Laying out blanks for articles drawn from sheet metal is still something of a mystery to most of us. Of course we can, if we take time enough and remember enough of our geometry, develop almost any shape on a flat plane. But this does not take into account the stretching of the metal in drawing into shape. And the chances are an experienced die maker can guess about as near to the shape of the blank as the drawing room layout will come. Some are mighty good guessers in this respect. The difficulty is in having them show someone else how to guess at the shape of a blank. Perhaps some of the experienced old-timers can give us a few hints that would be helpful as a beginning.

Budd Completes the Burlington "Zephyr"

This new, light-weight, high-speed, streamlined train was officially turned over to its owners last week

A SILVERY shaft of 18-8 stainless steel 196 ft. long, built by the Edward G. Budd Manufacturing Company for the Chicago, Burlington & Quincy Railroad, constitutes industry's latest answer to the demand for economic high-speed rail transportation. This articulated unit, named the "Zephyr," comprises three cars of which the forward one contains the engine room, mail and baggage compartments. In addition to a buffet grill and coach accommodations for smokers, the second car includes an area for express matter. The main body of the rear car is devoted to paired chairs adjustable from an upright to a semi-reclining position. Detached chairs occupy the circular glass-inclosed solarium in the rear which affords travelers 180 deg. of vision.

The Zephyr accommodates 72 passengers. All windows are equipped with shatter-proof glass including the bullet-shaped front of the first car and rear of the last car. All passenger compartments are equipped for radio reception.

Only sixteen wheels are used contrasted to 36 on conventional three-car equipment; the rear of one car and the front of the following one rest upon the same truck which makes for light weight, smooth riding, less noise and the elimination of jerk caused by slack between cars. Each of the four-wheeled trucks, having outside bearings, is rubber cushioned at 32 points. The wheels are of solid steel alloy with integral tread, rim toughened. All axles are equipped with roller bearings, and equalizing brakes are used throughout.

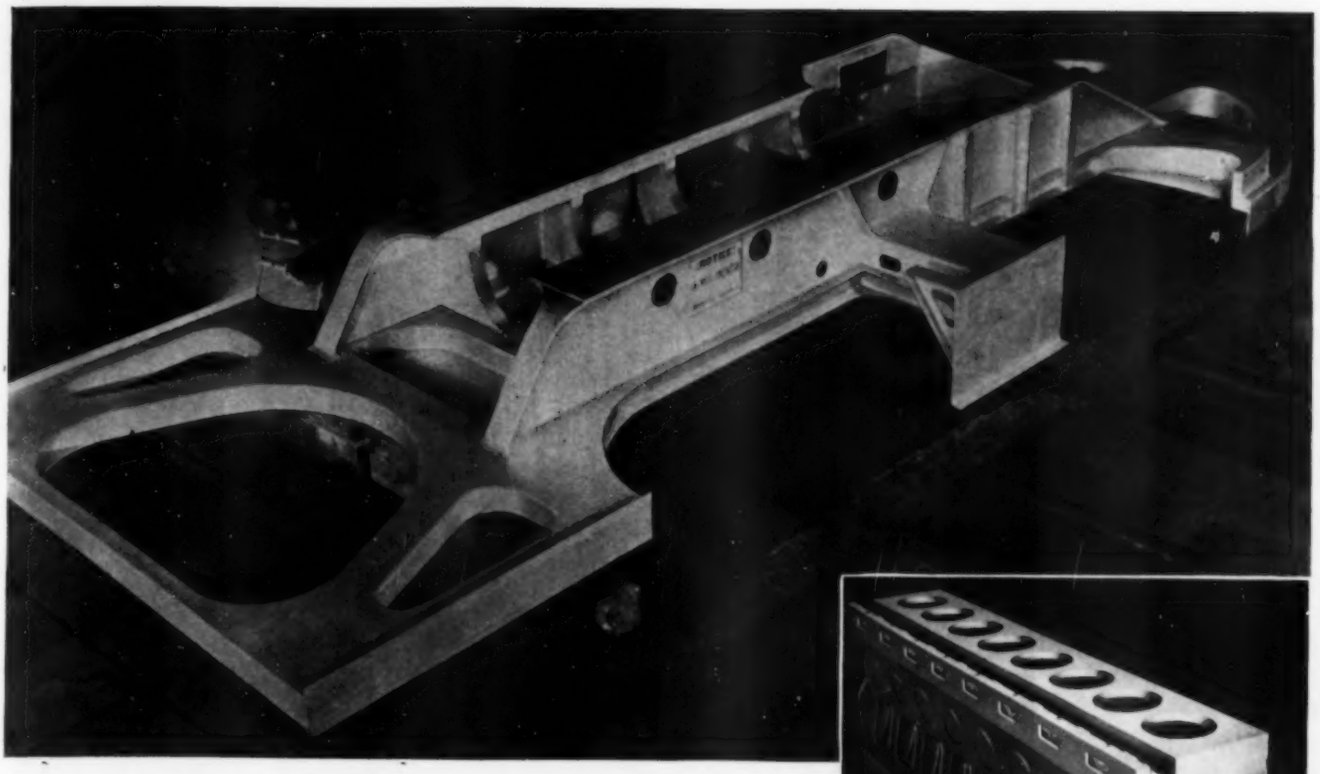
The Zephyr is driven by electrical equipment made by the General Electric Company. The generator which supplies power to the motors is driven by an eight-cylinder, 600-hp., two-cycle diesel engine developed by the Winton Engine Corporation, a subsidiary of General Motors.

The engine bed, or chassis of the motive power unit, developed by Lukenweld, Inc., is of welded construction, fabricated from Lukens Cromansil, a new high strength steel. This application is believed to be the first use of a welded steel engine bed on a motive power unit employed in main line railway service in America.

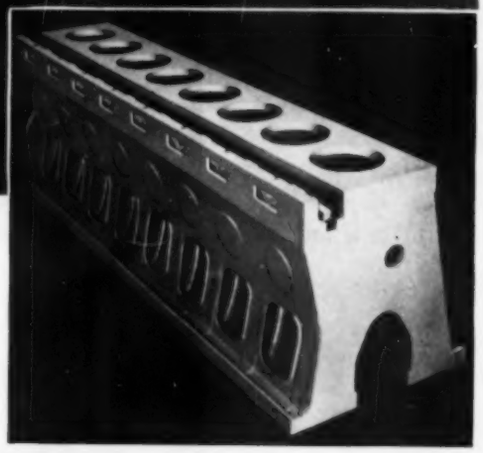
The steel underframe while weighing only 6,060 lb., supports a load of approximately 60,000 lb. It utilizes extremely moderate changes of contour to avoid concentration of stress. In addition to the engine bed the crankcase of the diesel engine is of welded construction contributing to a design which weighs only 22 lb. per horsepower.

The entire train weighs 95 tons, about equal to the weight of one Pullman car. The framework or skeleton of the train embodies a scientific latticed method of construction with the parts secured by electric welding rather than by riveting. For this the new Budd "Shotweld" process is used, in which each shot of current is precisely timed to give uniformity in the welds by unifying the sections without breaking down the physical characteristics of the metal.

Unlike the conventional car, the superstructure of the Zephyr does not rest upon a frame or sill. Instead, the points of contact with the trucks are heavy members or piers built integral with the ends of each car, the method of construction being comparable to that of a bridge. All horizontal and vertical stress members and weight sustaining parts in the train's framework consist of C-shaped struts and beams for maxi-



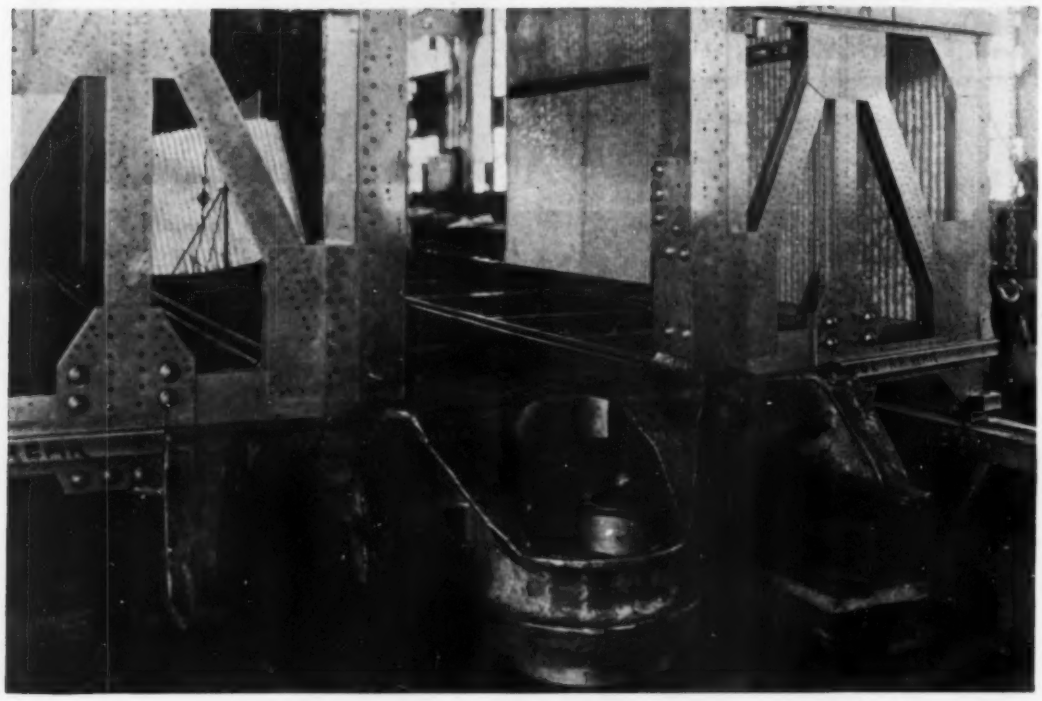
In making this welded Cromansil engine bed, Lukenweld used 204 separate plates cut to shape by the oxyacetylene flame, formed in presses and finally welded into one piece by means of the electric arc. Weighing only three tons itself, the bed supports a load of 30 tons



By use of careful design including this welded steel crankcase, the Winton diesel, which powers the Zephyr, was built to weigh only 22 lb. per horsepower

Here the Lukenweld engine bed is shown in place in the Shotweld stainless steel nose of the Zephyr

Bridge truss construction combines strength with lightness and permits articulated mounting whereby one truck serves for two cars



In the Zephyr the conventional longitudinal frame or sill is dispensed with. The end sill castings are combined with the Shotweld frame as illustrated

mum strength combined with lightness.

The insulation between exterior and interior sheathing is a metal foil almost as thin as tissue paper. Slightly crumpled before being placed in position, it insulates by reflection. Only 100 lb. of this material is required to insulate the entire train.

All passenger compartments are air conditioned with the windows sealed and the temperature thermostatically controlled.

The shape of the Zephyr takes advantage of modern application of scientific streamlining in which the contour of the front and rear ends, the design of the wheel guards, the concrete fluted sheathing, the absence of rivet heads and flush window frames are important.

Approximately 20 per cent lower than in usual equipment, the center of gravity, 51 inches above the rails, helps the train to hug the rails, gives it balance, and tends to avoid sway when rounding curves.

The train is scheduled for a two-months' exhibition tour from coast to coast after which it will be exhibited throughout the summer at the Century of Progress Exposition.

EDITORIALS

VOLUME 78 AMERICAN MACHINIST NUMBER 9

ESTABLISHED 1877

McGRAW-HILL PUBLISHING COMPANY, INC.

K. H. CONDIT F. H. COLVIN

EDITORS

Maintenance Costs

ACCORDING to railroad operating statistics, the cost of maintaining rolling stock accounts for an astonishing proportion of the total cost of operation—over twenty-five per cent. Several factors are directly involved in these costs. They are the lack of modern machine equipment in many shops, and the fact that operations are, for the most part, on quantities too small to justify more efficient methods. To a considerable extent the small sizes of the lots going through is aggravated by the great variety of locomotives and cars in use. Any sort of reasonable standardization would make it possible to increase greatly the number of parts put through in a single lot, and to reduce cost proportionately.

There is also another factor that affects the case adversely—the idea that railroad work is so different from any other kind of shop work as to put it in a class by itself. This attitude on the part of many railroad men makes it difficult for them to believe that machines and methods used successfully in other shops can be adapted to their work, and it has built up a sort of tradition that is responsible for a clinging to old ideas and practices. It is time to cultivate a desire to try the new methods and machines that have proved successful in other industries.

Blocking Recovery

QUESTIONABLE as the benefits of the AAA and NRA have been as means to national recovery they may be ranked as successful "experiments" when compared with the Securities Act of 1933. That Act has been highly effective in drying up the sources of industrial capital and is regarded by many thoughtful men as the principal obstacle to a full measure of recovery.

As every one knows, the consumer goods industries are within measurable distance of normal operation. And, as even the powers in the Administration are coming to see, the capital and durable goods industries are very far from that point, and are responsible for ninety per cent of our unemployment. Until they are as active as the consumer goods industries now are we need not expect a much greater measure of recovery than we have today.

Evidently there is little hope of any constructive action by Congress in making loanable funds available for the industrial and business units of moderate size. Bureaucratic jealousy and political maneuvering have stalled what looked like encouraging progress in this direction a month ago. PWA has certainly not had much success in promoting employment. The Johnson Act forbidding loans to defaulting national debtors bids fair to stifle a considerable portion of our budding foreign trade, much of which was in capital goods. All of which seems to pass the buck back to private capital.

After five weeks of intensive study the Durable Goods Industries Committee appointed by General Johnson at the conclusion of the meeting of the Code Authorities early in March has concluded that no permanent recovery is possible until the Securities Act is amended and liberalized so that capital will flow to the capital goods industries. Such revision would be a step backward from government socialization toward private initiative, and would be in line with the sentiment throughout industry that it is high time to abandon the harmful experiments undertaken in emergency and to correct the legislative and administrative mistakes that have been demonstrated.

A Lasting Asset

BECAUSE mechanisms have multiplied almost beyond enumeration during the past half-century, many people have come to overestimate their importance as compared to the skilled minds that created them and that maintain them in human service. Unfortunately, mass production has resulted in many maladjustments of employment, many undeserved losses on the part of individuals, and many unsolved social problems. High-pressure salesmanship sought to sustain mass production in too great volume before the depression erased the sales quotas from the conference room blackboards of 1929, and there are still numberless tasks in industry which are at the mercy of further advances in machine designing even though the sales manager's demands are less insistent than in the roaring days of expansion. The world looks to skill in things mechanical, however, to continue to release men and women from removable burdens of toil, and civilization owes to this very insight and power of creative achievement the development of new industries and of new outlets for human accomplishment out of the turmoil of passing eras and methods.

At a recent meeting of the American Association for the Advancement of Science held in Boston, the point was emphasized that skills of various sorts have been made progressively less important by the progress

of applied natural science. This may be relatively true. but it is unwise to overlook the fact that back of every mechanism stands the superior mind of its designer and maintainer. No inert motor, screw machine or printing press can rise above repetitive tasks, and no combination of steel, wood or fiber can originate advances. There is a dead level of cyclic functioning above which no machine can pass, and the dullest operative possesses potential capacities for suggesting improvements so long as he can think. Skill sounds the doom of obsolescent mechanism and will do so for ages to come. The more complex the age of machinery becomes, the greater the necessity for skillful understanding, handling and improvement of its tools.

.CHIPS.

Washington—Soak-the-rich Senate group revises the House Revenue Bill upward $220,000,000 and writes in publicity provision . . . 200 members of the House parade to the Union Station to welcome the President back from his vacation . . . Senator Austin, Republican, brings out evidence that Farley air mail cancellations had political aspect . . . Increase in business leads Farley to revoke order reducing mail deliveries and furloughing post office employees . . . Opposition to child labor amendment organizing in New York State . . . Roosevelt holds two-day conference with Senate and House leaders in turn to speed up action on important bills and hasten adjournment . . . Newton D. Baker calls first meeting of aviation investigation board and Roosevelt suggests that pending legislation be amended to provide for a general board to study an aviation policy for the nation . . . Presidential executive order authorizes General Johnson to approve assessment of code administration costs on all units of an industry . . . United Air Lines brings suit against Farley to enjoin him from enforcing air mail contract cancellation . . . Darrow committee criticizes Johnson and NRA in its first report which finds discrimination against small units.

Foreign—League of Nations reports gains in employment except in gold-standard countries . . . Franco-Polish alliance is renewed . . . Soviets celebrate completion of 100,000th tractor at Stalingrad . . . Esfonia drives Nazis out of office . . . Mussolini takes strong stand for peace . . . Russian flyers rescue ice-marooned scientific party off Siberia . . . British firms write code for steel industry . . . Italian sovereigns open model rural town of Sabandia in reclaimed Pontine marshes . . . Other towns to be built in this rich agricultural region where Mussolini expects to increase Italy's wheat production materially . . . Kalinin, chairman of Soviet Central Committee inaugurates 3,500,000,000-ruble loan campaign on Liberty Loan lines . . . League of Nations wants the Soviets to join . . . Japan scours world for scrap for her open hearths . . . British budget includes reduced taxes, increased doles . . . Japan tentatively threatens open-door policy in China, Washington ready to object . . . Nazis forbid export of marks.

Finance—Stockholders of Bethlehem and P.R.R. question official salaries in annual meetings . . . Congressional committees complete revisions ameliorating terms of exchange control and securities bills . . . Treasury calls $1,200,000,000 more of Liberty Bonds as of October 15 . . . Brokers' loans pass $1,000,000,000 for first time in over two years . . . Morgenthau opposes bill to pay off depositors in closed banks . . . President Roosevelt says McLeod bill to pay depositors in closed banks cannot be administered . . . 20 per cent of income went for taxes in 1932, reports National Industrial Conference Board.

Industry—Settlement of Motor Products strike ends Hudson shutdown . . . Curtiss Aeroplane threatens to close Buffalo plant and reopen Baltimore unit if strikers remain out . . . United States Lines would retire unprofitable Leviathan, ask loan to build faster cabin liner of the Manhattan class . . . American Iron & Steel Institute publishes telegrams from small steel companies to refute statement of Federal Trade Commission that steel code favors large units . . . Detroit toolmakers in tool shops strike for 20 per cent increase and 36 hours . . . Navy orders five-day week for 9,000 "white-collar" workers . . . Buys 400,000 lb. of stainless steel sheets from American Rolling Mill . . . Allis-Chalmers employees get 10 per cent increase . . . R. E. Olds regains control of Reo . . . Department of Labor adjusts statistics to new base—average of 1923-4-5—to make index more sensitive . . . Nash workers return as Seaman Body strikers accept terms . . . Roosevelt resumes consideration of railroad wage question . . . Southern industries fight NRA abolition of wage differentials.

Trade—Trade promotion tour of U. S. business men to Soviet Russia to sail June 21 . . . G.E. orders up 50 per cent in first quarter . . . Steel shipments in March largest in three years . . . Price increase brings big increase in second-quarter steel orders . . . Reduction of British automobile horsepower tax should help American exports.

Indicators—Steel production rate passes 50 per cent on the way up . . . Electric power production up 16.5 per cent over year ago . . . *Business Week* index up slightly to 65.7.

Railroads Need Motive Power ICC Reports Disclose

Only one new locomotive took the rails last year; one was on order January 1. Since then the purchase of 200 has been authorized by the Interstate Commerce Commission and locomotives now on order number 114. PWA money is the spearhead of the program for modernizing locomotive equipment. Purchase of the 200 new units is covered in applications to PWA for loans totaling $25,867,500.

Allotments by PWA totaling $21,863,500 to eight roads for 170 locomotives have so far bloomed into loan contracts with four roads totaling $18,186,500 for 134 locomotives as follows: Pennsylvania 101 (electric), $15,000,000; Nickel Plate 20, $1,635,000; Northern Pacific 10, $1,220,000; Pittsburgh & West Virginia 3, $331,500. Pennsylvania has 90 (electric) on order or under construction in its own shops; Nickel Plate, 20 on order, Pittsburgh & West Virginia 3, Great Northern 1.

Need for replacement and modernization of motive power is demonstrated in reports by the ICC whose authorization that acquisition of the equipment is "desirable for the improvement of transportation facilities" is prerequisite to obtaining funds from PWA. Seaboard is planning to buy five locomotives at $125,000 each that, it is estimated, will produce savings in operation practically paying for another new locomotive annually. With 50 per cent greater tractive power, the new engines will be able to handle the tonnage between Richmond and Raleigh in two trains daily in each direction that is now handled by three.

During the past two years the Northern Pacific has been trying to make one train do the work of two, but reports that its eastbound passenger and silk express cannot haul from twelve to sixteen cars, with the necessary intermediate stops, and maintain its schedule between the West Coast and Chicago, except by double-heading. To relieve this condition, the Northern Pacific considered two methods: Either to run additional train miles sufficient to keep the number of cars in the through train down to ten, or to buy more locomotives with sufficient tractive power to handle the train at the present schedule with a minimum of double-heading, helper service and second sections. The road informed the ICC that, based on actual statistics covering operation of the train, running of additional train miles under the method first considered would cost between $200,000 and $500,000 a year, depending on the pick-up in traffic, as compared with $107,000, representing the carrying and depreciation charges on ten new locomotives and incidental fixed improvements.

Numerous other applications disclose that present motive power is not adequate. Age and obsolescence has reduced the number of Lackawanna's steam locomotives in the past ten years from 755 to 557. The road reports that twenty new locomotives will be needed, not only on account of the existing shortage but because they can be operated at higher speeds and in other respects more efficiently than many now in service.

To answer by facts the question of economy in maintaining existing motive power, Transportation Coordinator Eastman's staff is completing a critical analysis of the motive power of all Class I roads in which repair costs will be shown in contrast with service secured over a given period; and with the tractive capacity and potential mileage remaining in them. In computing costs, locomotive miles, tractive power miles and potential boiler horsepower miles will be used as units. In order to arrive at a more correct determination of the economic life of motive power, locomotive horsepower will be computed according to a formula acceptable to a majority of the railroads.

The potential horsepower-mile is regarded as the logical unit for two reasons:

Speed is becoming the essence of service. Old locomotives can not be pushed without racking them to pieces and serious damage to rails.

Modern locomotives with the same tractive power as old require greater boiler capacity to maintain tractive effort at high speeds.

Every Class I road has been requested, in conjunction with the coordinator's study, to outline a complete repair and retirement program for a five-year period through 1938. In retiring locomotives that have reached the end of their usefulness, the railroads are asked to consider the advisability of relieving their current operating expenses of charges to "retirement," by obtaining permission from the ICC to include such charges in "profit and loss." The programs of individual roads will be analyzed and the facts pictured should be reflected in a general improvement in the condition of motive power.

New Haven to Add Streamlined Train

Contracts for two work-creating PWA loans totaling $8,600,000 to the New York, New Haven & Hartford Railroad which were signed last week include provision for a four-car high-speed train. Two cars will be provided with diesel electric power plants and will be used at the ends of the train enabling operation from either end. The train will be used between Boston and Providence; the run of 44 miles is scheduled to be made in 44 min., including a stop at the Back Bay Station in Boston. This train is to be ready about December 15.

One of the loans is for $1,300,000 to be used for new rails and fastenings. The railroad will use its own funds for laying the rail. In addition to the streamlined train, the second loan of $2,300,000 will be spent for 50 de luxe day coaches to be built in the Pullman-Osgood shop at Worcester, Mass.

NRA Committees Protest Pending Legislation

WASHINGTON—Two of the three committees, which were named (by the industries) following the Code Authority Conference last month to offer "alternative" proposals to the suggested plans of NRA to impose shorter working hours, have turned their guns on pending legislation as the crux of the recovery problem. These two groups, the durable goods industries committee headed by George Houston, president of Baldwin Locomotive Works, and the consumers goods industries committee headed by George A. Sloan, head of the Cotton Textile Institute, have taken unequivocal stands on the grounds that unless the securities act is amended, the stock exchange bill revised, and the Wagner and Connery labor bills stopped in Congress, recovery of the capital goods industries, with their three millions of unemployed, cannot be pushed. Industry needs help, but more than that it needs confidence, their reports say.

On the surface, the moves made from the pinnacle of their highly important advisory jobs to influence pending legislation would seem to be unpopular at NRA. Actually, the attitude there is that they have a perfect right to express their views as to what is the matter and what must be done to enable them to assume their job of reemployment and revival. NRA did not authorize these committees for that purpose, but if that is the way they feel, the advice is accepted. NRA is facing the issues as they stand, trying to push revival with the tools at hand.

Alexander Sellers to Head Metal Trades Association

The 36th annual convention of the National Metal Trades Association starts today at the Waldorf-Astoria in New York City. Nominations for new officers of the association are as follows: Alexander Seller, William Sellers & Co., president; Charles Strawbridge, Goodman Manufacturing Co., first vice-president; N. W. Pickering, Farrel-Birmingham Co., second vice-president; Harold C. Smith, Illinois Tool Works, Treasurer.

To serve for a period of two years the following have been nominated for election to the administrative council: E. B. Baltzly, Warner Gear Co.; Jacob D. Cox, Jr., Cleveland Twist Drill Co.; Harold Falk, The Falk Corporation; D. F. O'Brien, the A. P. Smith Manufacturing Co.; F. H. Payne, Metric Metal Works, and A. H. Timmerman, Wagner Electric Co.

During the two-day session addresses will be made on the following subjects: "The Extension of Government Supervision of Business," Phil Hanna, Editor, *Chicago Journal of Commerce;* "Legal Aspects of the Labor Relations Sections of the NIRA," David Clarke, Illinois Manufacturers Association; "Economic Developments in the United States and Foreign Countries Since Mid-Depression," Vaso Trivanovitch, National Industrial Conference Board; "The Monetary Situation, Dr. Edward W. Kemberer, Princeton University; "The Theory of Rodbertus and the NRA," J. D. Cox, Jr.; "Social Insurance Legislation," Noel Sargent, National Association of Manufacturers; "Our Experience with Employee Representation," Charles R. Hook, president, American Rolling Mill Co.; "Employee Representation Under the NIRA," H. F. Browne, National Industrial Conference Board; "Skilled Workers for the Future," George A. Seyler, The Lunkenheimer Company; "Sound Economics Applied to the NIRA," Dr. Louis H. Haney, New York University.

At the annual banquet, Frank Kent of the *Baltimore Sun* will speak on "The Washington Picture."

Foundry Equipment Orders Rise Sharply

March reports to the Foundry Equipment Manufacturers Association show an index of gross orders of 75.4 contrasted to 64.8 for February, and 9.8 for the corresponding month last year. Shipments rose from 42.9 in February to 62.6 in March, whereas in 1933 the March figure was only 19.7. Unfilled orders at 51.5 were off slightly from the preceding month when the index was 56.3; last year this figure was 50.4. The three months' average of gross orders for March was 59.5, compared to 48.9 for February and 31.4 for March, 1933.

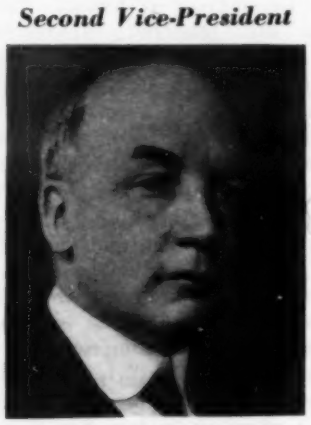
Metal-Working Code Hearings Scheduled

Date	Place	Deputy Administrator	Association
April 25	O. H. Office Bldg	L. S. Horner	Aluminum Wares (Division of FMPF)
April 27	Arlington Hotel	L. S. Horner	Hand Bag Frame Manufacturers (Division of FMPF)
April 27	Dept. of Commerce	E. W. Dahlberg	Medium and Low Priced Jewelry Manufacturers (modification)
April 27	Raleigh Hotel	L. J. Martin	Chemical Engineering Equipment Institute (Division of MAPI)
April 27	Raleigh Hotel	L. J. Martin	Locomotive Appliance Institute (Division of MAPI)
April 27	Raleigh Hotel	L. J. Martin	Electric Overhead Crane Institute (Division of MAPI)
April 27	Raleigh Hotel	L. J. Martin	Machinery & Allied Products Institute (modification)
April 27	Carlton Hotel	A. C. Dixon	Dowel Pin Manufacturers
April 30	Washington Hotel	K. J. Ammerman	Fire Extinguishing Appliance (modification)
April 30	Washington Hotel	K. J. Ammerman	Motor Fire Apparatus Manufacturers (modification)
May 1	Commerce Bldg.	C. L. Hickling	Wire Reinforcement
May 7	Lee House	C. F. Craig	Machine Applied Staple and Stapling Machinery (amendment)

Metal Trades President

ALEXANDER SELLERS

Second Vice-President



N. W. PICKERING

Treasurer

HAROLD C. SMITH

Milling Cutter Standard Approved

Simplified Practice Recommendation R36-34 has been accorded the required degree of approval by the industry and became effective on April 15, according to an announcement by the Bureau of Standards. The original recommendation was formulated in 1925. The number of sizes and varieties is reduced.

Code Authorities Given Teeth For Enforcement

WASHINGTON—There are new sets of officials, including distinguished economists, at work on compliance; legal machinery has been set up and lines of authority defined; compliance organization has been re-formed; NRA is getting into what looks like its real stride in putting codes to work. In addition, industry itself is being heard, and especially on one important point, perhaps the crux of the entire problem of making "self-government of industry" effective. For Washington is reverberating with its demands that code authorities, now to be increasingly used for code enforcement, shall make their decisions, take their action, subject to the approval of NRA, but that the code authorities shall not be required to ask that approval before they do anything, shall not have a disapproval, and repudiation hanging over them. In other words, they are asking a literal interpretation of the "delegation of authority" to the code authorities. In this demand, every trade association represented in Washington, the national organizations of trade association executives, and a powerful group within NRA itself, are steadily at work.

The twelve-point program of General Johnson has become the center of activities at NRA. Trade associations have been given what is probably the greatest boost in their history by the executive order of April 14 providing that members of the industry must pay their share of code enforcement; this order puts code authorities in a position, under NRA scrutiny of their budgets, to do their job, and trade association men point out that there will hereafter be no serious conflict between trade associations and code authorities, because where associations are strong, as in the automotive field, they will be the code authority, and where they are not, the code authorities will dominate, may easily develop into model trade associations.

The code authority financing plan answers Point No. 8 of the famous twelve: "A safe method of financing code administration without racketeering and abuse." Point No. 7, "A much improved method for securing prompt and effective compliance," is being arranged by a number of new office orders and instructions, now going out, and by the setting up of an office on "code authorities and classification problems" under Col. George S. Brady as deputy assistant administrator. Point No. 9 "elimination of inconsistent and conflicting provisions among various codes," has probably been put on the way to solution (along with many other problems), by the appointment of Dr. Leverett S. Lyon, of the Brookings Institute, and one of the most highly esteemed practical economists in Washington, as another deputy assistant administrator in charge of trade practice policies.

Employment Rises in Durable Goods Industries

Compared to an increase in employment of 4 per cent and in payrolls of 6.9 per cent, in 90 manufacturing industries, the durable goods group showed better than average gains of 5.6 and 10.3 respectively. While a seasonal improvement during March is normal, the rise in employment this year is greater than for any corresponding month in the Labor Department's records; the improvement in payrolls is better than any year since 1920. The 90 manufacturing industries showed an increase of 255,000 employees, adding approximately $8,475,000 in weekly wages, in March. In one year 2,750,000 workers have been rehired by private industry.

Summer Meeting of A.S.M.E. to Be Held at Denver

Denver, Colo., will be the scene of the semi-annual meeting of the American Society of Mechanical Engineers, to be held June 25 to 28 at the Cosmopolitan Hotel. Two papers, one on passenger tramways and the other on smoke problems, will be presented during the first session.

On the second day, two simultaneous sessions will be held, one on heat engineering, covering air conditioning, experiences in the burning of pulverized lignite and petroleum coke. The other session will be an informal round-table discussion arranged by the Management Division on the subject of the decentralization of industry.

A semi-formal banquet will be addressed by Colonel Paul Doty, president of the society, and by Captain Pat O'Hay. Papers presented the following day will include a discussion of beet-sugar manufacturing, mining in Colorado, and a description of a unique example of cooperative manufacturing. At another session, held simultaneously, recent progress in the development of high-speed light-weight railway trains will be reviewed by representatives of the Burlington and Union Pacific lines.

• INDUSTRIAL REVIEW •

• April sales of machinery and machine tools seem to have been smaller in volume than those for the previous month. Dstributors from practically all of the important industrial centers attribute the decline to labor troubles and consequent uncertainty. In most cities the last half of the month was better than the first. Inquiry continues strong.

• Conditions in the East were spotty. Boston business was off, Philadelphia business up and New York sales were little changed. Inquiries in the Pittsburgh territory are giving salesmen plenty to work on but sales, although better, are not in much volume. Business in Cincinnati was not so good. Leaders of the industry lay the drop to threats of strikes although no serious ones have occurred there.

• Strikes in 38 tool and die plants disturbed the situation in Cleveland. Labor leaders are keeping their demands moderate enough so that there is a tendency on the part of employers to meet them rather than fight. Machinery manufacturers are still experiencing an improvement in sales.

• Uncertainty for the future is holding back equipment buying in Detroit. Automobile shops are running at or near capacity but their purchases of machinery are limited to vitally needed specialties rather than standard machines. If the labor situation should settle down there would unquestionably be a rush for machinery replacements.

• Chicago notes little change since last month but reports an encouraging increase in inquiries. In St. Louis the volume of inquiries and orders is improvng slightly but is still not very husky. Automobile assemblers and body builders are on strike in two plants. Settlement of the Nash strikes has cleared the air in Milwaukee and machinery men there are feeling rather hopeful.

Machine Tool Orders Show Slight Decline

Results of the first report of the supervisory agency of the machine tool industry indicate a slight decline in both domestic and foreign orders for March. The index base used in this report differs from that formerly employed by the National Machine Tool Builders' Association in that it is based on the average monthly shipments for 1926, whereas the old index was a percentage of the years 1922, 1923 and 1924. The report is compiled from returns from 156 companies which is more than twice as many as were included in the association figures. Since the first of the year, the indexes of orders on the revised basis are as follows:

	Domestic	*Foreign*	*Total*
January	44.5%	10.1%	54.6%
February	41.1	10.9	52.0
March	40.7	8.2	48.9

These results are counter to the usual seasonal trend as March is usually high. When arranged according to size of companies, based on the volume of business done in 1926, the smaller companies, 80 in number, reporting a 1926 volume of less than $200,000, show orders increasing from January on. The breakdown of the 156 reports into two groups follows:

Group A—76 companies reporting sales over $200,000 in 1926

	Domestic	Foreign	Total
January	44.1	10.9	5.50
February	40.2	11.6	51.8
March	39.3	8.7	48.0

Group B—80 companies reporting sales less than $200,000 in 1926

	Domestic	Foreign	Total
January	49.0	1.5	50.5
February	51.4	2.4	53.8
March	55.6	2.6	58.2

A further study of distribution of all orders was made from the frequency table showing the number of reports by classes in percentage of each company's sales to its own 1926 volume:

Percentage Class	Number of Reports Jan.	Feb.	Mar.
100% of 1926 or better	21	20	20
50-99%	28	31	36
Less than 50%	107	105	100

The greater number of reports are in the class "less than 50 per cent of an average month in 1926," but the progressively lessening number of such reports from January to March, and the progressively increasing number of reports better than 50 per cent of 1926 indicates a gradual improvement in the character of distribution, in spite of a downtrend in the actual volume of business.

PWA Allotments for Loans to Railroads

COMPANY	PURPOSE	ALLOTMENT
Railroad companies	Rails and fastening	$41,000,000
New York-Washington, Pennsylvania R.R. Co.	Electrification and equipment	79,000,000
Lehigh & New England R.R. Co.	New freight cars	1,500,000
New York, New Haven & Hartford R.R.	Equipment	5,500,000
Northern Pacific Ry.	Locomotives	1,250,000
Chesapeake & Ohio Ry.	Gondola cars	18,290,000
Erie R.R.	New equipment	11,964,000
New York, Chicago & St. Louis R.R.	New equipment	5,029,000
Boston & Maine R.R.	New equipment and repairs	5,500,000
Central of Georgia R.R.	New equipment	500,000
Interstate R.R. Co.	Railroad improvements	250,000
Receivers Wabash Ry.	Railroad improvements	1,489,800
Kansas, Oklahoma & Gulf Ry Co.	Railroad improvements	265,000
Baltimore & Ohio R.R.	New equipment	4,230,000
Southern Pacific Co.	Railroad improvements	12,000,000
Illinois Central R.R.	Railroad improvements	9,300,000
Midland Continental R.R.	Equipment	40,000
Lehigh Valley R.R.	Equipment	2,500,000

Railway Applications Pending as of February 15, 1934

Insofar as possible applications for loans for rails and fastenings will be filled out of the $41,000,000 blanket allotment

NAME OF APPLICANT	PURPOSE	LOAN REQUESTED
Alabama, Tennessee and Northern R.R.	Repairs and equipment	$200,000
Arkansas Valley Interurban Ry.	Rail	100,000
Bartlett Western Ry.	Maintenance	5,000
Bellevue and Cascade R.R.	Equipment	40,000
California and Oregon Coast	Extension	5,718,565
Carolina Southern	Ties and maintenance	25,000
Chicago Great Western R.R.	Rail and fastenings	1,117,500
Chicago, Milwaukee, St. Paul and Pacific R.R.	Rail, repairs and equipment	8,607,383
Fonda, Johnstown and Gloversville R.R.	Equipment	200,000
Fort Smith and Western	Repairs and maintenance	75,000
Great Northern Ry.	Rail and fastenings	1,500,000
Gulf, Mobile and Northern	Equipment	1,000,000
Hoosac Tunnel and Wilmington R.R.	Miscellaneous items	5,100
Huntington and Broad Top Mountain R.R.	Rail and fastenings	40,000
Interior Motor Ship Lines, Inc.	Floating equipment	100,000
International and Great Northern R.R.	Equipment	2,000,000
Louisiana and Arkansas Ry.	Repairs, rail and equipment	500,000
Maine Central	Rail and fastenings	500,000
Minneapolis, St. Paul and Sault Ste. Marie	Equipment	500,000
Missouri and North Arkansas R.R.	Rail, repair and maintenance	250,000
Missouri Southern R.R.	Equipment	55,000
New York Central	Rail and fastenings	2,500,000
Nezperce and Idaho R.R.	Ties	6,400
Pittsburgh, Shawmut and Northern R.R.	Equipment	.....
Pittsburgh and Susquehanna R.R.	Repairs and maintenance	20,000
Pittsburgh and West Virginia	Equipment	331,000
Port Angeles Western R.R.	Extension	200,000
Quebec Extension Ry.	Extension	4,800,000
Savannah and Atlanta Ry.	Equipment	500,000
Santa Fe, San Juan and Northern R.R.	Maintenance	50,000
Seaboard Air Line	Rail, repairs and equipment	10,000,655
St. Johnsbury and Lake Champlain R.R.	Bridge structure	20,000
St. Louis, San Francisco R.R.	Rail and fastenings	1,445,000
Tallulah Falls Ry.	Maintenance	87,000
Tennessee Central	Rail and fastenings	110,000
Waco Beaumont, Trinity & Sabine R.R.	Extension	5,000,000
Wilkes and Western R.R.	Extension	225,000
West River R.R.	Equipment	25,000
Wisconsin Central	Rail and fastenings	250,000
Wyoming-Montana R.R.	Extension	79,404,900

Spain Builds Diesels

WASHINGTON—Development of diesel engine construction in Spain, begun last year, is advancing rapidly at present according to reports to the Department of Commerce. Four diesel engines of 1500 hp. have been turned out by the Sociedad Espanola de Construccion Naval, at Sestao, and delivered for use in two 8,000-ton vessels of the Spanish Petroleum Monopoly. The motors were of the Sulzer type.

Maquinista Terrestre y Maritima of Barcelona has delivered two diesels of 975 hp. each for use in a 4,500 ton motor tanker of the Petroleum Monopoly. These motors were of the Burmeister type. This company is also planning to construct four more 2,500 hp. diesels of the Krupp type for delivery to the Compania Transmediterranea.

Gear Manufacturers to Meet at Wilkinsburg

With E. W. Miller, of the Fellows Gear Shaper Co., presiding, the annual meeting of the American Gear Manufacturers Association will be held at the Penn-Lincoln Hotel, Wilkinsburg, Pa., May 3-5. According to an announcement by B. F. Waterman of Brown & Sharpe, the following program will be presented:

"Economical Advantage of the Single Helical Gear," Richard S. Marthens, Westinghouse Electric & Mfg. Co.; "Controlling Costs and Employees Compensation," W. A. Barr, Foote Bros. Gear & Machine Co.; "A.G.M.A. Speed Reducer Rating Formula and Its Development," W. P. Schmitter, The Falk Corporation; "Recent Development in Gear Steels," T. R. Rideout, Westinghouse Electric & Mfg. Co.; "Selling Gears to Special Fields," L. A. Graham, The Falk Corporation; "Noise Measurement of Gears," Prof. F. A. Firestone, University of Michigan; "Uniformity in Commercial Standards," E. S. Sawtelle, Tool Steel Gear & Pinion Co.; "The Machine Hour Rate—Its Importance and Computation," Prof. C. L. Van Sickle, University of Pittsburgh.

At the annual banquet, Ralph E. Flanders, vice-president of Jones & Lamson Machine Co., will speak on "The Future of Private Enterprise." H. H. Kerr, president, Boston Gear Works, will preside over the session held on May 5 for discussion of the gear manufacturing industry's code. "Phases of the National Recovery Act" will be the subject of a talk by Howard Dingle, of the Cleveland Worm and Gear Co.

J. M. Wilson Appointed To Gear Code Authority

John M. Wilson, president of the National Supply Co. and president of the Spang-Chalfant Co., succeeded Neal W. Foster as administration member of the gear manufacturing industry code authority. Other code authority members appointed to represent the administration are as follows: machine knife and allied steel products manufacturing, E. A. Srill, president of the General Box Co.; hide and leather working machine industry, Cleon R. Johnson, formerly eastern sales representative, Philadelphia Rubber Works Co.; beverage dispensing equipment industry, W. G. Hildebran, assistant secretary, Wellman Engineering Co.; tool and implement manufacturing industry, Harry C. Carr, administrative director for Philadelphia County Relief Board; oil burner industry and gasoline pump manufacturing industry, Harold V. Engh, vice-president, Anaconda Wire and Cable Co.; die casting manufacturing industry, William D. Ward, consulting engineer; marking devices industry, Sam T. Johnson, vice-president, Standard Sand & Machine Co., non-ferrous hot water tank industry. F. E. Barth, vice-president of the Graton Knight Co.; wrench manufacturing industry, Isham Keith; gray iron foundry industry, W. C. Connelly, president, D. Connelly Boiler Co.

R. E. W. Harrison Heads Machinery Division

Succeeding W. H. Rastall, R. E. W. Harrison, formerly chief engineer of the Cincinnati Milling Machine Co. and Cincinnati Grinders, Inc., has been named chief of the Industrial Machinery Division of the Bureau of Foreign & Domestic Commerce. Mr. Rastall has become associated with the Capital Goods Section, Division of Research and Planning of NRA.

After extensive experience in foreign markets Mr. Harrison in 1926 assumed the position of mechanical engineer with the Cincinnati Milling Machine Co. On incorporation of Cincinnati Grinders, Inc., a subsidiary of this concern, he was made responsible for all engineering activities of the two companies.

In 1932 Mr. Harrison established a consulting engineering practice on problems of design, management and marketing. He is at present chairman of the committee for standardization of tolerances and allowances for cylindrical parts and limit gages, organized by the American Standards Association. He is secretary of the executive committee of the Machine Shop Practice Division of the A.S.M.E. He is vice-president of the Society of American Military Engineers.

Mr. Harrison is the author of many technical papers presented to engineering societies in the United States and Great Britain. He has been awarded the Croix de Guerre, Victory Metal, Allies Medal and other decorations.

• EXPORT • OPPORTUNITIES

The Harikume Needle Co., 526 Nakamotocho, Higashinari—Ku, Osaka, Japan, desires: (1) complete equipment to make 10,000 sewing machine needles per 10-hr. day, (2) complete equipment of maximum productivity to make hand sewing needles of standard pattern.

*No. 7337. Brussels, Belgium. Machinery for manufacturing wall and roofing material from cane sugar waste.

*No. 7338. Melbourne, Australia. Looms for weaving Axminster carpets and rugs.

*No. 7345. Guadalajara, Mexico. Machine for pulverizing horns and bones.

*No. 7352. Saigon, French Indo-China. Coffee processing machinery. (Purchase and agency)

*No. 7350. Chihuahua, Mexico. Clothes pins, hardwood with steel springs, manufacturing machinery and equipment; and equipment for manufacture of steel springs.

*No. 7366. Santa Cruz, Canary Islands. Elevators for hospital.

*No. 7359. Alexandria, Egypt. Laundry machinery.

*No. 7355. Guadalajara, Mexico. Silverware manufacturing machinery, and silver sheet rolling, stamping, and molding machines.

*Interested American firms and individuals may obtain the names and addresses of the foreign firms making these inquiries upon application to the Bureau of Foreign and Domestic Commerce, U. S. Dept. of Commerce, Washington, or any district or cooperative office.

CORPORATION • REPORTS •

Addressograph-Multigraph Corp.

Two months ended Feb. 28, net profit $87,247; first two months of 1933, net loss $29,040.

Auburn Automobile Co.

Quarter ended Feb. 28, net loss $857,395; previous year, net loss $577,466.

Briggs Mfg. Co.

For 1933, preliminary report, net profit $1,591,424; for 1932, net loss $1,898,421.

Caterpillar Tractor Co.

First quarter, net profit $787,477; first quarter, 1933, net loss $303,883.

Consolidated Machine Tool Corp. of America

For 1933, net loss $319,021; for 1932, net loss $283,308.

Crocker-Wheeler Electric Co.

First quarter, net loss $8,094; first quarter 1933, net loss $68,666.

Graham-Paige Motors

First quarter, net profit $15,142; first quarter, 1933, net loss $86,696.

Indian Motorcycle Co.

First quarter, net profit $31,256; first quarter, 1932, net loss $46,826.

Minneapolis-Honeywell Regulator Co.

First quarter, net loss $21,425; first quarter 1933, net loss $128,256.

Nash Motors Co.

Quarter ended Feb. 28, net loss $123,720; same quarter, year ago, net loss $134,136.

Reece Folding Machine Co.

For 1933, net income $38,730; for 1932, net profit $16,797.

Standard Screw Co.

For 1933, net profit $47,674; for 1932, net loss $162,909.

Waterbury Clock Co.

For 1933, net income $15,516; for 1932, net loss $34,053.

S. S. White Dental Mfg. Co.

For 1933, net income $375,361; for 1932, net loss $516,800.

• BUSINESS ITEMS •

It is understood that the Delco-Remy Co., Anderson, Ind., will purchase considerable box-making machinery to replace equipment lost in a recent fire.

The Mitchell Specialty Co., Holmesburg, Philadelphia, Pa., is now engaged in the manufacture of a general line of metal moldings and shapes, either in straight lengths or bent form, and a great variety of cross-sections.

The Marr-Galbreath Machinery Co., 58 Water St., Pittsburgh, Pa., will move on May 1 to 55 Water St., where larger display facilities are available.

The Union Twist Drill Co., has appointed the A. J. Glesener Co., 975 Brand St., San Francisco, Calif., as representative in San Francisco and Northern California, for its line of milling cutters, gear cutters, hobs and saws.

The Providence Engineering Works, Inc., Providence, R. I., has appointed R. Lewis Giebel, 236 West 55th St., New York, N. Y., as representative for its line of sensitive, ball-bearing drill presses.

The Service Machine Co., Elizabeth, N. J., has appointed the following representatives for its line of presses, dies, tools and special machinery: Production Machinery Sales Co., Inc., Detroit, Mich.; L. Heres DeWyk & Son, Derby, Conn.

The Amthor Testing Instrument Co., has moved from 309 Johnson St., to 4-10 Leo Place, Brooklyn, N. Y.

Announcement is made of the licensing by the Falk Corp., of Milwaukee, of the J. D. Christian Engineers, for the manufacture of "Rite-Lo-Speed" motors under the original Christian design. The standard motor units known as Series HD are manufactured by the Christian organization under pending patents owned by J. D. Christian.

• OBITUARIES •

Dr. Oskar von Miller, founder of the Deutsches Museum at Munich, Germany, died April 9 at the age of 78. The museum popularized science, industry and engineering by exhibits that can be operated through push buttons by the visitor.

E. H. Bruner, secretary, Chicago Wheel & Mfg. Co., died recently at the age of 61. He is succeeded by Arthur T. Dalton, formerly manager of the Detroit Branch.

Charles E. Golden, president and founder of the Golden-Anderson Valve Specialty Co., Pittsburgh, died April 10.

W. O. Platt, 74, retired president of the Joseph Reid Gas Engine Co., Oil City, Pa., died April 19. He was a pioneer in the oil industry. "Echoes From the Oil Country" by *W. Osborne* were from his pen.

• PERSONALS •

A. J. Howell has been appointed manager af the Pacific Coast district of Revere Copper & Brass Incorporated to succeed R. H. Binns, Jr., who has moved to the executive effices in New York City, as assistant general sales manager.

L. Clifford Goad, who has been associated with the General Motors Corp., for 11 years, has been made general manager of manufacturing of the AC Spark Plug Co., Flint, Mich.

Andrew B. Holmstrom, recently technical secretary to George N. Jepson, vice-president and treasurer of the Norton Co., Worcester, Mass., has been made works manager of the Norton Grinding Wheel Co., Ltd., Welwyn Garden City, Hertsfordshire, England.

Homer L. Mueller has been made vice-president and general manager of the Cleveland Welding Co., Cleveland, Ohio. He has been identified with the company since 1920.

Frank F. Seaman, general manager of the hoist and crane division, Robbins & Myers Sales, Inc., was recently elected chairman of the Electric Hoist Manufacturers Association. Carl O. Hedner, connected with the Yale & Towne Mfg. Co., Philadelphia, was elected vice-chairman.

J. M. Frank, president of the Ilg Electric Ventilating Co., Chicago, Ill., was recently elected president of the National Association of Fan Manufacturers. C. A. Booth, vice-president of the Buffalo Forge Co., Buffalo, N. Y., was made vice-president.

John F. Tingsley, vice-president of the Crompton & Knowles Loom Works, Worcester, Mass., has been appointed as an alternate industrial member of the New England Regional Labor Board.

Frank Cary has joined the sales engineering organization of the Austin-Hastings Co. Inc., ParKett Machinery Division. Mr. Cary will operate out of Hartford, covering the state of Connecticut and Western Massachusetts, for the sale of metal-working machinery.

• MEETINGS •

American Gear Manufacturers Association. Annual meeting. May 3-4. Penn-Lincoln Hotel, Wilkinsburg, Pa.—headquarters of association. J. C. McQuiston, secretary.

American Society of Mechanical Engineers. Petroleum meeting, May 14-17. Tulsa Hotel, Tulsa, Okla. Harold Atkinson, secretary, Tulsa Bldg. Summer meeting, June 25. Cosmopolitan Hotel, Denver, Colo. Calvin W. Rice, secretary, 29 West 39th St., New York, N. Y.

American Society for Testing Materials. Annual meeting, June 25-29. Chalfonte-Haddon Hall, Atlantic City, N. J. A. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

American Supply & Machinery Manufacturers Association. Convention. May 22-23. Netherland Plaza Hotel, Cincinnati. R. Kennedy Hanson, secretary, 604 American Bank Bldg., Pittsburgh, Pa.

American Trade Association Executives. One-day conference of government officials, representatives of business and trade association executives. May 1. Hotel Mayflower, Washington, D. C.

Chamber of Commerce of the United States. Twenty-second annual meeting. May 1-4. Washington, D. C.

Machinery & Allied Products Institute. May 14-15. Hotel Cleveland, Cleveland, Ohio. John W. O'Leary, managing director, 221 N. La Salle St., Chicago.

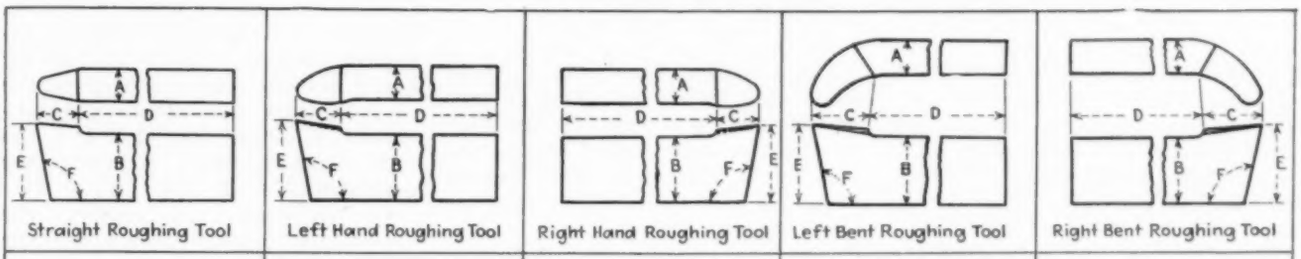
Society of Automotive Engineers. Summer meeting, June 17-22. Saranac Inn, Saranac Lake, N. Y. John A. C. Warner, secretary, 29 West 39th St., New York, N. Y.

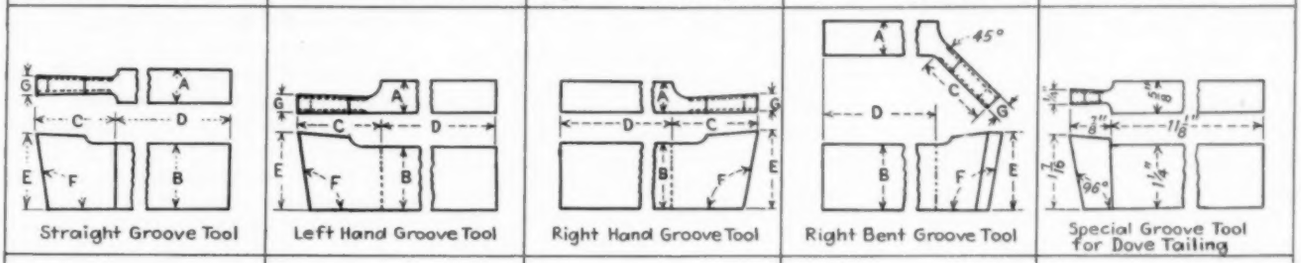
American Machinist

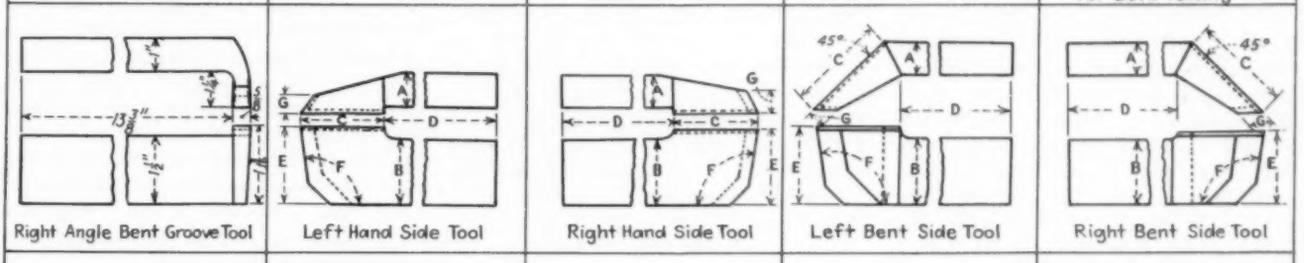
REFERENCE BOOK SHEET ©

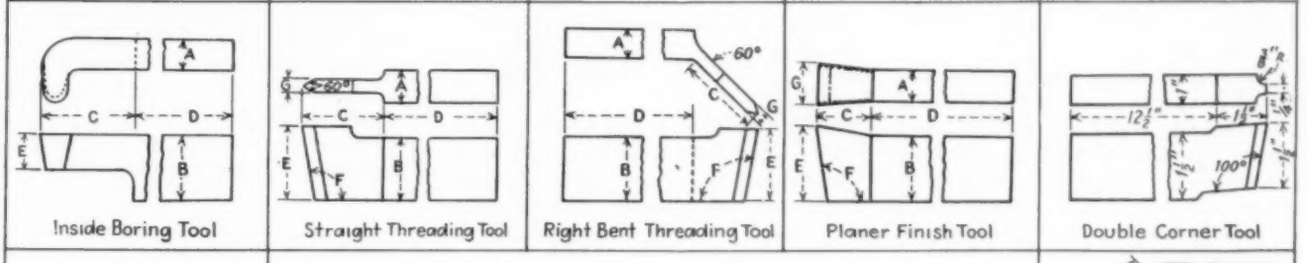
Dimensions for Forged Tools

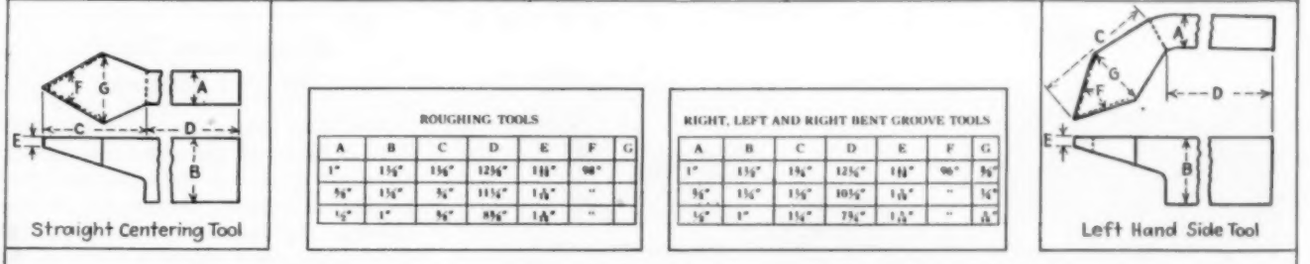
Courtesy of the Midvale Company




Straight Groove Tool
Left Hand Groove Tool
Right Hand Groove Tool
Right Bent Groove Tool
Special Groove Tool for Dove Tailing







ROUGHING TOOLS

A	B	C	D	E	F	G
1"	1½"	1⅜"	1²⅜"	1⅜"	90°	
⅝"	1⅛"	¾"	1¹⅛"	1⅛"	"	
½"	1"	⅝"	⅞⅝"	1⅛"	"	

RIGHT, LEFT AND RIGHT BENT GROOVE TOOLS

A	B	C	D	E	F	G
1"	1½"	1⅛"	1²½"	1⅛"	90°	⅝"
⅝"	1⅛"	1⅛"	10½"	1⅛"	"	¼"
½"	1"	1¼"	7⅞"	1⅛"	"	⅛"

CENTERING TOOLS

A	B	C	D	E	F	G
1"	1½"	3½"	1²½"	¼"	60°	1⅝"
⅝"	1¼"	3"	10"	⅛"	"	1⅜"
½"	1"	2½"	8"	3/16"	"	1"

SIDE TOOLS

A	B	C	D	E	F	G
1"	1½"	1⅝"	1²½"	1⅛"	100°	⅝"
⅝"	1⅛"	1⅛"	10½"	1⅛"	"	⅜"
½"	1"	1¼"	7⅞"	1⅛"	"	¼"

PLANER FINISH TOOLS

A	B	C	D	E	F	G
1"	1½"	1⅝"	1²½"	1⅛"	90°	1⅜"
⅝"	1¼"	1⅛"	10½"	1⅛"	"	⅜"
½"	1"	1¼"	7⅞"	1⅛"	"	⅜"

BORING TOOLS

A	B	C	D	E	F	G
1"	1½"	4½"	12"	1"		
⅝"	1¼"	4"	10"	⅝"		
½"	1"	3½"	8"	½"		

THREADING TOOLS

A	B	C	D	E	F	G
1"	1½"	1⅝"	1²½"	1⅛"	105°	⅛"
⅝"	1¼"	1⅜"	10½"	1⅛"	"	⅛"
½"	1"	1¼"	7⅞"	1⅛"	"	⅛"

STRAIGHT GROOVE TOOLS

A	B	C	D	E	F	G
1"	1½"	1⅝"	1²½"	1⅛"	90°	⅜"
⅝"	1¼"	1⅜"	10½"	1⅛"	"	⅛"

What Is a 14-in.x6-ft. Engine Lathe?

C. W. SPICER

Chairman, Sectional Committee on Standardization of Small Tools and Machine Tool Elements

YOUR answer to this question will depend upon your point of view. Either you have some specific make and design in mind, or if you happen to be familiar with several makes of lathes, you will probably reply, "What do you mean, 14-in. x 6-ft. engine lathe?"

Well, just what *do* you mean? The catalog of one well known make states that the swing over the "bed" or "shears" is 16½ in. and over the compound rest is 8⅝ in. and that it will take work between centers 33½ in. long and weighs skidded for domestic shipment 2,550 lb.

From another well known catalog we learn that presumably a similar size of lathe is known as 13-in. and 15-in. x 6-ft. That two heights of head and tail stocks are regularly made—the two machines being otherwise identical. Both take only 22⅝ in. between centers and the 13-in. actually swings 15 in. over the "shears" and 9¼ in. over the compound rest, and the 15-in. swings 16¼ in. over the "shears" and 10½ in. over the compound rest. Skidded for domestic shipment the two weigh 1,800 lb. and 2,015 lb., respectively.

These two catalogs were the first two the writer picked at random but we all know that he could easily have found greater dissimilarity without going far in his search. Even these vary 25 to 35 per cent difference in weight and 50 per cent in length of work that can be accommodated!

The purchasing department naturally wants some leeway or option to purchase at the lowest price. On the other hand, the production chief has no idea whether the lathe of a certain nominal rating will upon arrival even receive his work, not to mention economical machining, unless he instructs the purchasing department to purchase only a *specific make* which the production chief happens to know will serve his purpose.

The foregoing illustrations also show that the 14-in. dimension means practically nothing although in the early days it was supposed to mean the diameter of work which the lathe would "swing" over the "bed," "shears," "ways," "cross slide," or what have you.

It has been stated (not verified by the author, but it sounds plausible) that by selection of makes and rating and arbitrarily taking the "swing" over the bed or over the cross slide as a gage, standard engine lathes may be currently purchased ranging in size increments of only ¼ in. from 9 in. to 16 in. and by ½-in. increments from 16 in. to 36 in.!

Perhaps all this multitude of sizes is necessary for various commercial reasons but the user wonders if that is really so.

What has been said of lathes also applies in principle to milling machines, drill presses and many other comparatively standard machines. For example, what is a No. 2 milling machine or a 14-in. drill press?

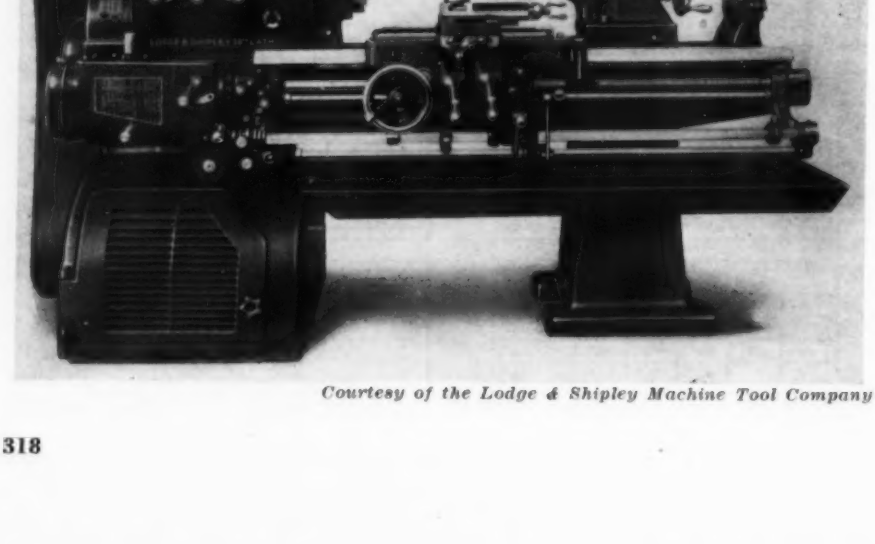
A committee operating under the procedure of the American Standards Association was appointed because of an urgent demand for simplification of the present situation by several large *users* of machine tools and it was believed that all *users* would be somewhat similarly interested. From the *manufacturer's* view point, one has built up a good business making lathes, let us say, that are built light, and without expensive refinements, to be sold at the lowest possible prices for a given size range of work that can be accommodated. It should be noted that this type of machine fills a real need in the community.

On the other hand, another lathe manufacturer has built up a satisfactory business in the making of lathes which are extremely sturdy and with ultra refinements for handling the heaviest cuts with extreme accuracy. In order to return a reasonable profit this manufacturer must obtain a considerably higher price than the other for a machine of similar nominal dimensional rating.

How far can widely applied standardization be successfully carried along the lines described without interfering with desirable progress from year to year?

Obviously, considerable work can be done in simplifying and standardizing the terms, names of machine parts, etc., which are in common use. *But how much further than that can we go?*

If you are interested in this subject either as *user* or as *manufacturer* of machine tools will you not write the editor of the *American Machinist* briefly outlining your reaction to the foregoing questions for the guidance of the committee mentioned? A summary of replies will be published at a later time. Your name will not be published if you wish.



Courtesy of the Lodge & Shipley Machine Tool Company

Preheating Metal Before Cutting

Few shop subjects arouse more conflicting ideas than flame or torch cutting. Some use it extensively in shaping connecting rods and other parts of machinery. Others insist on drilling out the openings and chipping between the holes where they fail to cut into each other. These shops insist that the heat of the torch injures the metal for a long distance from the cut and makes cracks that may cause failure. Those who use it feel that a quarter inch kept for finish makes everything O.K. Still others heat the piece to be cut up to perhaps 1,000 deg. and feel that this eliminates the dangers of injury to the steel. But in spite of fears and theories, flame cutting increases year by year.

THE ROUND TABLE

Within Reason

"Ed, just what should we expect from a man for the wages we pay him?"

"I don't get you, Al. We get what we pay for, don't we?"

"Are you telling me, or asking me?"

"Both, I've never heard any one ask that question in just that way before, and it isn't quite clear what you have in mind. Explain."

"Well, last week I asked one of my men to clean the machine next to him at the same time he was cleaning his own. He refused, saying he was not paid to clean machines. I asked him what he was paid for and he said, 'I don't know, what do you think?' "

"What did you tell him?"

"The only answer I had at the time was to tell him I paid him to do as he was told. Since then I've wondered if I was right?"

"Why not, what'd you do, fire him?"

"Not yet, maybe he was right."

"Yeah, maybe in your plant, but not where I work. If a man doesn't do as I tell him, he walks."

"Maybe that man will. I don't like his attitude, but I want to decide just what I do pay him for, and what I may expect from any man in our employ."

"Well, I know that already. I hire them to do as they are told, within reason."

"That's too indefinite, Ed. You might tell him to go home and mind the baby."

"Maybe. If I did I'd expect him to do it. Then I'd expect him to come back and get me fired. Williams has told us that when a man does something out of the way, not to jump on him in the presence of the other men, but get him off alone somewhere. I believe that's reasonable, and it's just as reasonable for a man to do as he's told and then come back at the foreman."

"I guess you're right, Ed, but that isn't what I'm trying to get at. What should any man, or woman for that matter, expect from a person they hire? Should they expect reasonable promptness in going to work? Should they expect some loyalty and personal interest? Should they expect anything over and above their presence?"

"I think it lies with the boss, Al. The man you asked to clean the machine thought you were soft. Some men mistake consideration for timidity, you know, and his first impulse was to bluff you; then he had to make it good. Some men are like that."

"The question I'm trying to solve is whether all men are not like that. I've noticed it among all classes of men. In the East Indies, where there is a rigid caste system and in the West Indies where there's none, you hire a man for a specific job or purpose, and they'll quit before they'll go outside that work. I've seen big men feel affronted at being asked to do something that they considered beneath their dignity. Remember that fellow that quit a $15,000 job because they wanted him to ring a time clock? Maybe it's an inherited trait."

"Inherited nothing, just too much false pride. There's only one way to cure that kind of duck, fire him."

"Maybe I'll have to, but I still want to find out what I should get for my money. Instead of hiring mechanics and specialists with magnified caste egos, perhaps I'll hire farm hands, if any of the old type can be found. They are the one class of people I know that worked with an eye to their employer's interest. I've known them to work fourteen hours a day, all summer, cheerfully and willingly. They never thought of overtime. My men are supposed to work eight hours and won't work five minutes overtime."

"The thing that bothers me, Al, is to keep them working the eight hours."

What obligation is imposed by the acceptance of a wage?
How can the limitations of an occupation be fixed?

Discussion

Unions—Horizontal or Vertical?

After working with both horizontal and vertical unions, there is no doubt in my mind that the highest type are the horizontal. The horizontal has better organization and more effective leaders. Their broader knowledge of general conditions throughout the country is exceedingly helpful in combating stubborn or bluffing management. The members and leaders are not tied to any one little picayune industry and often are of broader executive caliber than the presidents and general managers with whom they have to battle.

The only alternative to unions, offering better advantages to the men, is departmental specialists who can bulldoze the management into believing that if all the dressers or the carders strike that it would be impossible to replace them. These myths exist today.

I saw the results of one of these that was punctured so badly that, the specialized craftsmen, who always insisted that it required four years for an apprentice to learn the operation, in six months were eating the dust of some good strong backed Poles who cared not a bit for precedent and former customs but went right ahead and quickly learned the operation. They turned out yields that saved the company some $2,000 per week, formerly thrown out as waste by these high-grade four-year-to-learn specialists.

If the management is able to get some of its friends in the plant to sell the vertical union to the men, it will surely result in a far more stable shop. The management will be continually posted as to the undercurrent of feelings and be able to anticipate any radical moves by the men. In fact, one vertical union functioned, for a year or two, so well for the management that the vice-president in the front office knew what was happening at the union meeting two or three hundred yards away on Main Street before the members had adjourned and started their committee to the office.

Until the desire to play fair and be honest is in the hearts of both labor and management, there can be little constructive progress made in any plant. Every shyster management breeds two or three shyster labor leaders who generally can outsmart management.

—E. E. Gagnon,
Mechanical Superintendent.

NRA and the Small Shop

It is common knowledge that initiative and progress come from individuals and not from governments. Individuals should, therefore, have the greatest possible freedom to make their ideas effective, and the only restriction necessary is that they shall not be allowed to interfere with the freedom of others. The great danger of governments is that they tend to become the happy hunting grounds for maggot-like bureaucrats whose destructive abilities are too frequently concealed within the mass of community goodness till the damage they do has gone much too far.

The sole function of governments should be to maintain equity and equal freedom. The law of equity—the impartial balance for all transactions in human associations—is the fundamental natural law that makes man-made laws unnecessary. Equity is superior to justice because it has a more definite measuring quality. Questions of what is right or wrong can best be solved by finding the simple equity of them. When people ask themselves, "What is the equity of this or that?", they will find it more accurately than they now do, with the millions of laws and regulations that are merely substitutes for the real thing.

The perception of equity as the impartial balance makes it appear as a measure that sincere judges would prefer to use instead of the mass of contradictory laws that so often turn the courts of justice into courts of injustice. If the NRA codes themselves were put into the scales of equity to justify their own existence then it might be seen that the problems regarding large or small businesses may be best determined according to their efficiency and merit.

—L. Brown,
Montreal, Canada.

What Share?

There is at present no way of determining labor's share in industry. Our method of fixing prices puts a price on what is not human work; e.g. land. Those who work to pay that price are not worked for in return. Our monetary unit represents a product, and products are composed of human work and natural resources. The latter are as much the gifts of nature to all of us as is the air we breathe. The only part of a product anyone can owe another person for is the human work expended in its production. But, with our present monetary unit, we have no way of knowing what portion of the product is human work and what natural resources. For nature yields varying quantities and qualities to equal effort.

Not until prices are fixed by the actual duration of the human work expended in producing each item will it be possible to determine labor's share in industry. That will not be until humanity learns that nothing should have a

price except our services for each other. And our services for each other can be equitably measured only by their duration. We owe no one any service for the bounties of nature.

If Ed does for Al the thing Al wants done, in the way and at the time and place Al wants it done, Al owes Ed an equal duration of service, doing what Ed wants done, in the way and the time and place Ed wants it done. If the monetary unit represents one hour's work of one human adult for another such person, paying the market price for anything is receiving such service and thus serving in return. But who can now tell how much human work has gone into the making of anything? Labor's share is the equitable share, which can only be determined by an equitable monetary unit.

—W. E. Brokaw,
Secretary, Equitist League.

Averaged Dividends?

From the lowliest individual up to the state itself the one demand today is for security. The employee demands it in the form of a definite minimum wage with security of employment. The executive demands it so that he can plan ahead and arrange his outlays accordingly. The investor, as distinct from the speculator, shows his tendency by the current demands for gilt-edged stock. And the nation itself demands it so that it may pursue an even course free from the pitfalls and obstacles that block the normal channels of trade.

Too many concerns take a short-sighted view when a year of good business is concluded and declare skyscraper dividends which send the price of the stock rocketing upwards. But the same concerns after a poor year cut down the payroll by heavy discharges and reduce the dividend or pass it altogether. In the resulting slump the employees have to tighten their belts, the stockholders have to cut expenses, the credit of the company is lowered and the old vicious circle of depression is complete once more.

How much better it would be for all if other industrial concerns followed the lead of Al's company. The employees would be sure of full earnings all the year round, the stockholders would not have to stint themselves owing to the fear of reduced income next year, and business generally would be in such a healthy state that the nation's financial controllers could also plan ahead.

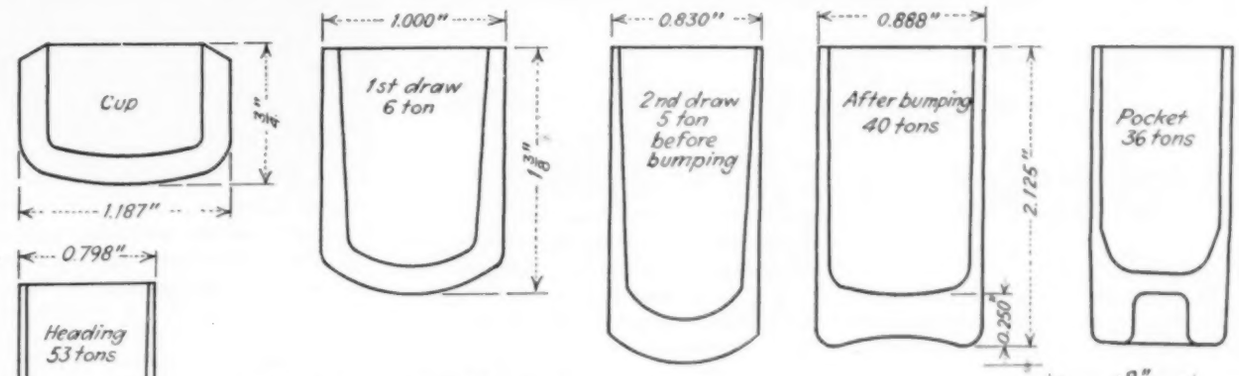
The division of profits between dividends and amortization should vary according to the class of industry. Obsolescence and wear are variable quantities but the figure of 50 per cent of the profits for dividends should be quite ample to satisfy the average stockholder.

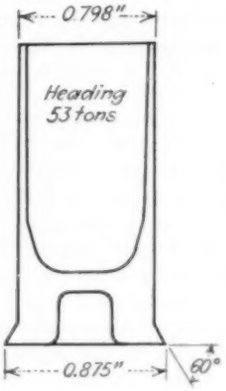
The prosperity of a people is not built up on the wealth of a few speculators who look for quick returns, but on the vast number of employees in industry and trade. Averaged dividends allow the creation of ample reserves and with their assistance the worst of depression storms can be weathered. Any device that tends to achieve this object is worthy of universal adoption.

—Roy Vernon Wade,
Glasgow, Scotland.

Press Work Pressures

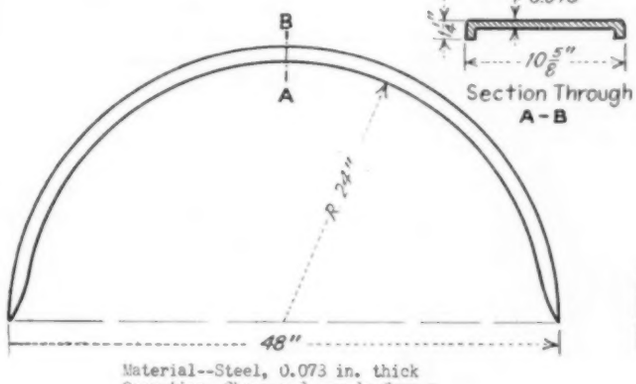
Series XXXIII— *Miscellaneous Operations*



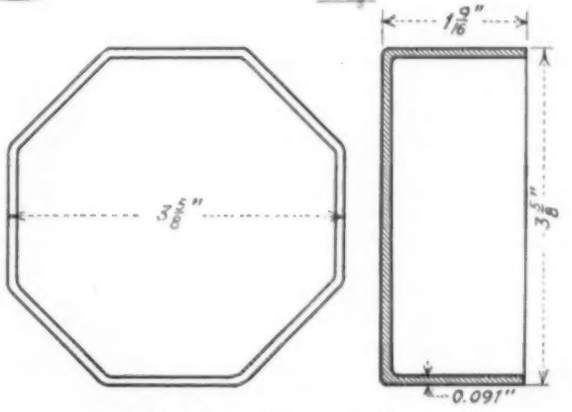


Material--Brass blank 1-3/4 in. in diameter by 0.250 in. thick
Operation--Draw a 50-calibre cartridge case

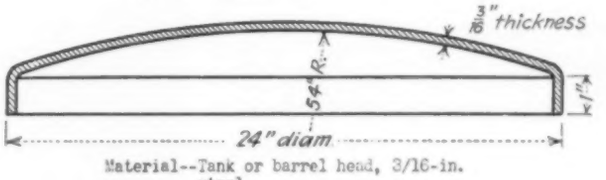
Pressure--	
Cup	25 tons
First draw	6 tons
Second draw	5 tons
Bumping	40 tons
Pocket	36 tons
Heading	53 tons



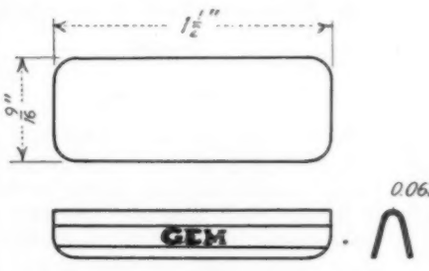
Material--Steel, 0.073 in. thick
Operation--Shape mud-guards from a blank 75-1/2 by 13-1/8 in.
Pressure--200 tons



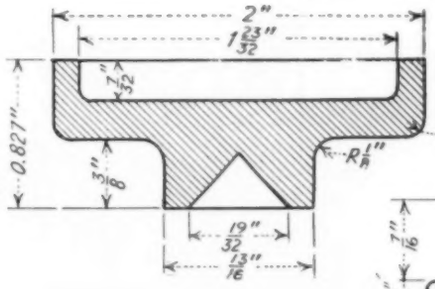
Material--Steel, 0.091 in. thick
Operation--Blank and draw a junction box
Pressure--100 tons



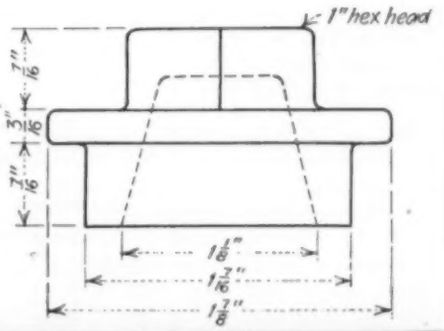
Material--Tank or barrel head, 3/16-in. steel
Operation--Draw or form
Pressure--300 tons



Material--Steel, 0.062 in. thick
Operation--Razor blade back. Raised letters coined with new dies -
0.035 in. high, 50 tons, not clear
0.062 " " 40 " " "
0.062 " " 50 " clear
100 ton press should be used.
Testing should be done in testing machine



Material--Tobin bronze. Blank 1-7/8 in. in diameter by 3/8 in. thick
Operation--Hot-forge piece shown
Pressure-- 250 tons



Material--Tobin bronze, blank 1-1/16 in. diameter by 7/8 in. long
Operation--Hot-forge a nut with a 1-in. hexagon head
Pressure--100 tons

Contributed by C. W. LUCAS

© *American Machinist*

· IDEAS ·
FROM PRACTICAL MEN

A Recessing Tool for the Drill Press

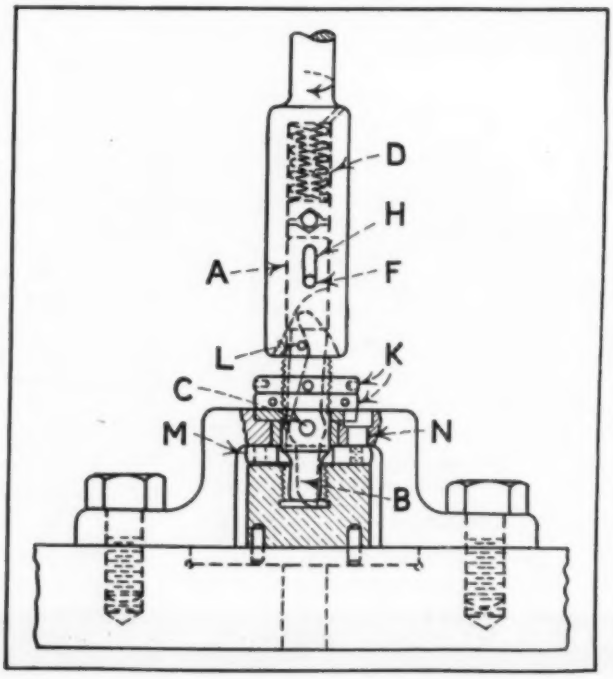
R. M. BENNETT

In the illustration is shown a tool for cutting a recess at the bottom of a blind hole for clearance in tapping or grinding. Also a holding fixture for the work.

Fitting a slot in the bar *A*, the cutter *B* is pivoted therein by the pin *C*. The bar holding the cutter is a sliding fit in the hollow shank and telescopes therein against pressure of the spring *D*. It is revolved with the shank through the pin *F* engaging the slot *H*. As the spindle is lowered and the stop collars *K* contact with the top of the fixture, the beveled edges of the hollow shank contact with the angular top of the cutter, causing the cutter to swing on its pivot and feed the cutting edge into the work.

Cutting continues until the pin *F* reaches the bottom of the slot *H*, at which time the stop collars *K* are held tightly in contact with the top of the holding fixture and prevent the spindle from being lowered further. Depth of cut is controlled by adjusting the stop collars on the cutter bar. On raising the spindle, the spring holds the cutter bar down until the pin *F* reaches the top of slot *H*. In the meantime, the pin *L* has contacted the inner angle at the top of the cutter, causing the cutter to swing upon its pivot and withdraw the cutting edge from the recess. Further upward movement of the spindle withdraws the tool from the hole.

The work is located by pins engaging holes drilled in the bottom of the work. These pins are secured in a plate let into the table of the machine and are short enough to permit the work to be slid over them without interfering with the fixture. The work is held down by the cam plate *M*, which is pivoted on the screw *N* and is operated by a lever, not shown.



With this tool, recesses for tapping or grinding clearance can be cut to a desired depth at the bottom of a blind hole

Surface Plate Made From Discarded Motor Base

GEORGE B. THOM

Lehigh University,
Department of Mechanical Engineering

The discarded base of a dynamometer motor was converted into the surface plate illustrated. Channels for collecting oil are at all four sides and the under side is well braced with crisscrossed ribs well filleted in the corners. The top and the sides of the elevated portion were planed and scraped to true surfaces, the sides being square with each other and perpendicular to the flat top, which is about 39x57 inches.

This convenient surface plate was made from the discarded base of a motor. The stand has rigid legs of pipe and adjustable feet

The stand is made of 2½-in. pipe, holes for which were drilled and tapped in the solid corners at the under side. Tees with side outlets receive the lateral braces, which have "longscrews" cut on one end so that they can be assembled in place without unions. The tees were plugged at the bottoms, the plugs being drilled and tapped for the adjustable feet. All pipe threads were sealed with iron cement.

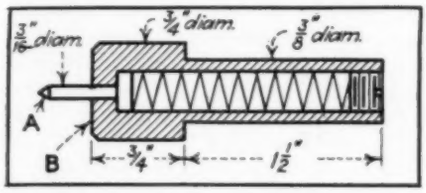
A convenient place for laying small tools is provided by the oil trough, leaving the top of the plate clear. Beneath the plate are an adjustable light, a large drawer, and a shelf for parallels, knife-edged straight-edges and other accessories.

A Locator for Faceplate Work

FRANK J. MAILE

When holes that have been laid out and prick punched are to be accurately bored in work mounted on the faceplate of a lathe, it is generally necessary for the operator to have the assistance of some one to hold the work in approximate location while the clamps are being manipulated.

Such assistance can be eliminated by the use of the device illustrated. It is held in a drill chuck mounted in the tailstock spindle, and the spindle is advanced until the center *A* enters the prick-punch mark in the center of the hole to be bored. This locates the work approximately, prior to being tested with the wiggler. To hold the work



Without assistance, the lathe operator can locate and clamp work on the faceplate in close approximation to correct position by using this device

in location while it is being clamped, the tailstock spindle is further advanced, the center *A* being telescoped into the holder against the pressure of a light spring behind it, until the end *B* is pushed tightly against the work, holding it while it is being clamped.

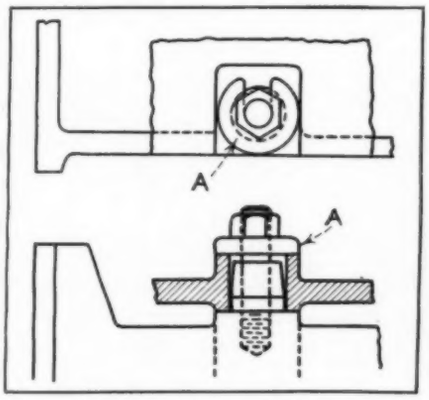
When tested with the wiggler, it will be found that the work has been located within from 0.002 to 0.005 in. of the correct position and will require but very little adjustment. There need be no fear that the center *A* will mar the prick-punch mark, as the spring behind the center is very light. The center *A* should be slightly blunter than the prick punch used in laying out the work, so that when it enters the punch mark it will bear on the sides of the mark and not on the bottom.

Locating Bushing Plates

HAROLD E. MURPHEY

In large jigs where the bushing plates are not hinged, they are generally located by several studs in the jig bodies. Since the locating holes in the bushing plates must fit the studs closely, there is naturally more or less of a jamming action in placing or removing the plates.

If the studs are made as shown in the illustration, the parallel fit in the holes in the bushing plate is so short that the plate can be placed or removed without jamming. In removing the bushing plate, the nuts are backed off slightly and the C-washers *A* are removed. As the clamping nuts are smaller than the holes in the bushing plate, they offer no interference in handling the plate.



If the nuts are loosened and the C-washers are removed, the bushing plate can be lifted off, as the nuts are smaller than the holes

Utilizing an Old Drill Press

CHARLES C. TOMNEY
Chief Tool Designer
Carrier Engineering Corporation

An old drill press was converted into a spotting machine for back-facing by cutting off the column just beneath the square table and suspending the upper part upside down on a portable bench made of angle iron. The cone pulley was removed and a pulley for a V-belt drive was put in its place, power being supplied by a motor on the bench. The general arrangement is shown in Fig. 1, while in Fig. 2 the back-facing cutter *A* can be seen projecting above the work.

The advantage gained by this arrangement is that the arbor for the cutter projects upward through the hole to be spot-faced, the cutter being on top of the work where the operator can at all times see what it is doing without stooping and looking beneath the work.

Fig. 1—Part of an old drill press is suspended upside down from the portable bench by its square table and the spot-facing is done from above

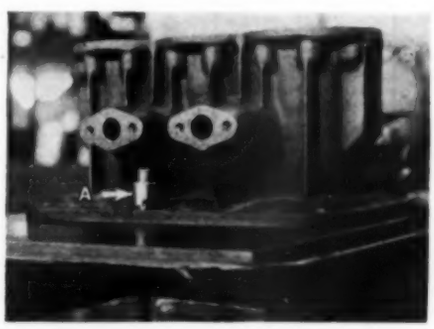


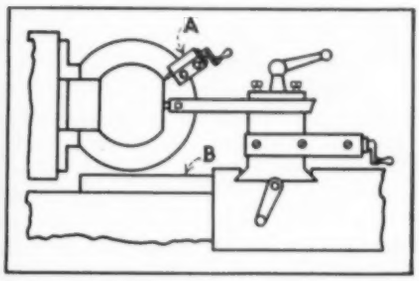
Fig. 2—The cutter *A* can be seen above the work and is fed to the cut by drawing down the spindle of the drill press

Turning Spherical Surfaces

S. LOMAS
Openshaw, Manchester, England

An order for a large quantity of gunmetal parts having spherical surfaces resulted in the somewhat unusual set-up illustrated. The work was 9 in. in diameter, having a 1½-in. bore.

The headstock of another lathe of the same swing as that on which the work was to be done was mounted on an angle plate at the rear of the lathe and at a right angle to the line of centers. A single slide-rest was mounted at *A* on the faceplate of the extra headstock and was fastened so that the cutting point of the tool was directly over the line of centers.



With this improvised set-up the spherical turning was done in good time, the boring being done at the same time

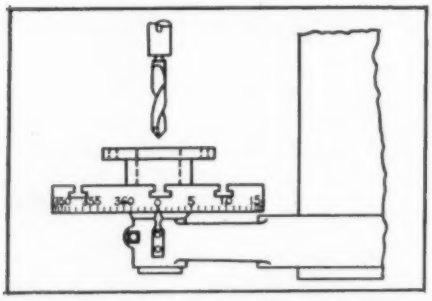
One end of the bar *B* was attached to the carriage, its upper surface being covered with leather and suitably guarded to prevent chips from lodging thereon. This bar was directly under the faceplate on the extra headstock, so that as it traversed with the carriage the faceplate was rotated, causing the tool to describe an arc. The top of the leather on the bar was 0.015 in. higher than the distance between the lathe bed and the under side of the faceplate, thus giving the required amount of friction to rotate the faceplate.

Turning the spherical surface and boring the hole were carried on simultaneously. The lathe was equipped with a square turret on the cross-slide, the turret being provided with tools for boring, facing and parting.

Indexing in the Drill Press

WILLIAM RAMSEY

At times in almost every shop there is drilling to be done that involves indexing. For work requiring no great accuracy, such as bolt holes in flanges, the usefulness of the drill press can be greatly increased by graduating the periphery of the table and attaching a pointer to the hub of the supporting arm, as shown in the illustration. A



Graduating the periphery of drill-press table will provide means for index drilling where no great accuracy is required

number of holes can then be drilled in a circle more accurately and quickly than if laid off with dividers.

A further improvement is to cut circles in the face of the table, about half an inch apart and concentric with the hole in the center. The circles will serve as a guide in centering work approximately. If warranted by the quantity of work, a plug can be fitted to the central hole in the table, the upper end being turned to fit a hole in the work. By this means, work can be accurately centered and any number of duplicate pieces can be drilled without disturbing the set-up.

A Gripper for the Crane

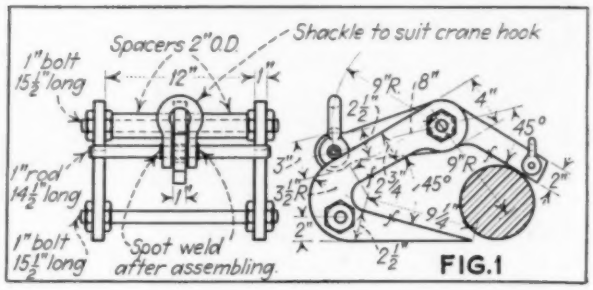
PAUL C. BRUHL

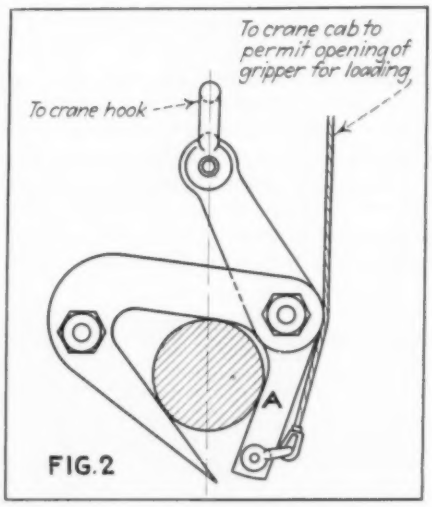
A gripper that will enable the crane operator to pick round bars from the floor without the aid of a helper and to hold them securely during transportation is shown in the illustrations.

Loading the gripper is done by the crane operator from his cab, placing the device over the bar, as shown in Fig. 1, and raising the arm *A* by a rope that is led to the cab by a pulley on the trolley. In hoisting, the upward pull of the crane hook causes the gripper to close about the bar and hold it securely, as shown in Fig. 2. Ropes, chains or slings and the attendant danger from their use are thus eliminated, as is also the necessity for exact balancing of the bar.

The main parts of the gripper are

Fig. 1—Details of an effective crane grip for handling round bars. The proportions are important. Fig. 2—Bar in the gripper and rope for releasing load





cut from 1-in. boiler plate by a torch and are held together by bolts and spacers. No machining other than drilling the holes for the bolts and machining the contact surfaces is necessary. The gripper can be used for lifting bars into lathes or grinders. If made to the dimensions given, it will handle bars as large as 6 in. in diameter and will safely carry a load of 2,000 pounds.

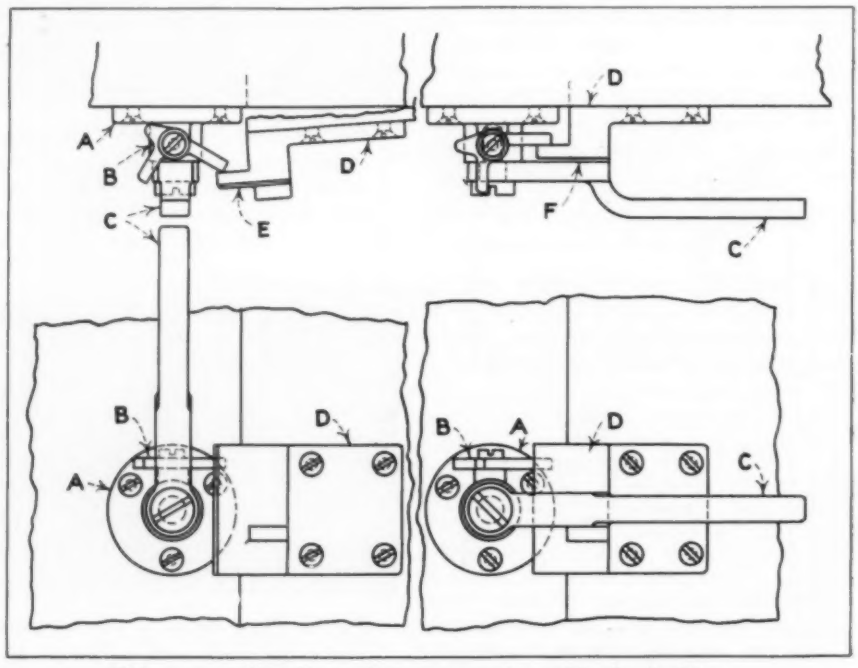
Device for Opening and Closing Tight-Fitting Doors

VINCENT WAITKUS
Mechanical Engineer

Where doors for refrigerators and the like must be tight enough to exclude the entrance of air, the device illustrated will make their operation easy.

The bracket *A* is attached to the door jamb and carries the fork cam *B* and the operating lever *C*, both of which turn freely on shoulder screws. Bracket *D* is attached to the door and its offset is tapered vertically at *E*. When the door is closed, the lever *C* is horizontal, its part *F* being in contact with the tapered part of bracket *D* and holding the door tightly to its seat, as in the view at the right.

Rotating the lever in a counter clockwise direction, as it nears the vertical position it contacts with the short fork of the cam *B*, the long fork being behind the offset of the door bracket. Further rotation of the lever in the same direction, rotates the cam and causes the long fork to partly open the door, as in



Using a small bell crank in connection with the locking handle makes it easy to open a tight-fitting door

the view at the left. In closing the door by hand, the offset part of the door bracket comes into contact with the long fork of the cam and the closing action rotates the cam, causing the short fork to rotate the lever clockwise until it engages the taper on the door bracket. Pushing the lever by hand into the horizontal position, it acts on the taper of the door bracket and forces the door tightly to its seat.

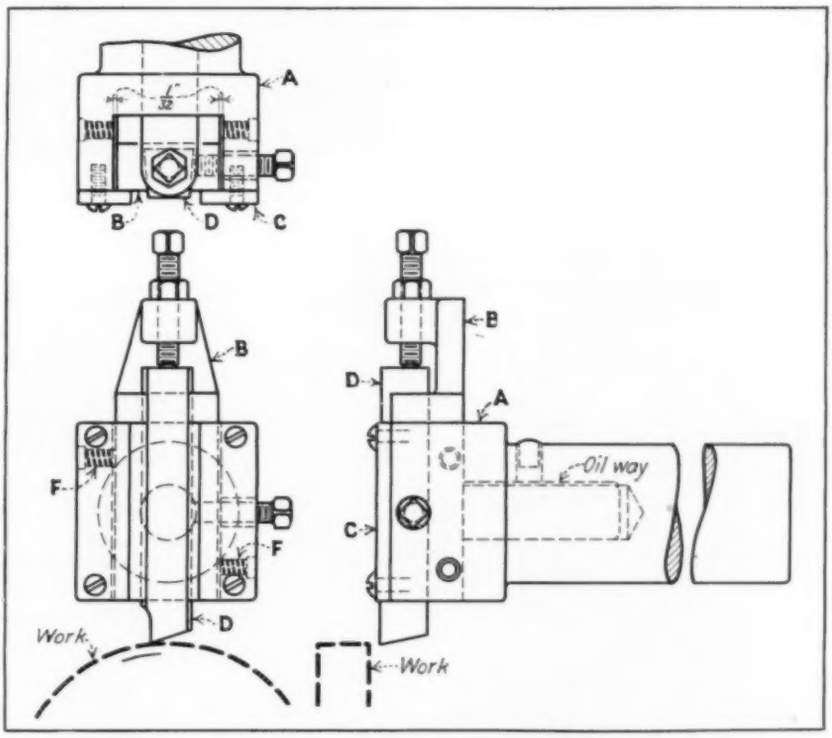
A Self-Relieving Tool for the Turret Lathe

HAROLD E. MURPHEY

The tool illustrated was designed for use in an automatic turret lathe for finish turning such work as gear blanks, pulleys, sleeves and bushings. Its construction prevents the cutting tool from dragging and scoring the finished work as the turret returns to the starting position.

Essentially, the tool consists of the cast-iron body *A;* the cast-iron toolholder *B;* the steel gibs *C;* the high-speed steel tool *D;* the compression springs *F;* and the necessary screws. The shank of the body fits one of the holes in the turret and its outer end is bored and reamed to receive the shank of the toolholder, which is free to rotate therein. The front of the body is recessed to receive the toolholder, the recess having a clearance of $\frac{1}{32}$ in. on each side, thus permitting the toolholder to swing a limited amount each side of the center.

In operation, before the cut is started, the springs swing the toolholder in a direction opposite to that of the work as far as the recess in the body will permit. When the tool contacts with the work, it and the toolholder will be forced by the pressure of the cut in the same direction as that of the work, limited, of course, by the clearance in the body, and they will remain in that position until the end of the cut. When the cut has been finished, the springs will again swing the toolholder back to its first position, permitting the tool to clear the work and to be returned to the starting point without scoring the finished surface.

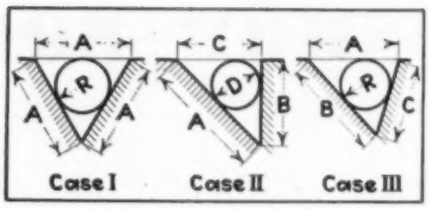


Pressure of the cut forces the toolholder in counter-clockwise direction. When the cut is finished, the springs force it in the opposite direction, permitting the tool to clear the work

Measuring V's With Rod or Wire—Discussion

CHARLES KUGLER

While I was keenly interested in the article by Edward Heller under the title given above (*AM*—Vol. 77, page 925), I believe that the part dealing with finding the diameter of a rod that will eliminate the dimension *F* in Mr. Heller's illustrations can be greatly simplified.



In reality, the problem consists in finding the diameter of an inscribed circle in a triangle when the lengths of the three sides are known. While the lengths of the sides are not given in the article under discussion, it is a very simple problem to calculate their lengths from the information given therein.

In Cases I and II, the process can be greatly shortened because in Case I we have an equilateral triangle and the radius of an inscribed circle can be found by the simple formula: $R = A \times 0.288675$. In Case II, we have a right-angled triangle, and the diameter of an inscribed circle can be found by the formula $D = (B + C) - A$.

In Case III, the formula given in "Wentworth's Plane and Spherical Trigonometry," page 87, will apply.

It is: $R = \sqrt{\dfrac{(S - A)(S - B)(S - C)}{S}}$

where $S = \dfrac{A + B + C}{2}$.

This formula will give the radius of an inscribed circle in any triangle.

C. A. JOHNSON

The formulas given by Edward Heller in an article under the title given above (*AM*—Vol. 77, page 825) are useful and their derivations are interesting. However, I think they would be more useful if the derivations were more simple and direct, thus leading to a better understanding.

For Case I, $C = \dfrac{A}{1 + \csc \dfrac{B}{2}}$ can be derived as follows:

$$A = C + D = C + \left(C \times \csc \frac{B}{2}\right)$$

$$= C\left(1 + \csc \frac{B}{2}\right)$$

$$C = \frac{A}{1 + \csc \dfrac{B}{2}}$$

For Case II, $A = C + D = C + \left(C \times \cot \dfrac{B}{2}\right) = C\left(1 + \cot \dfrac{B}{2}\right)$

$$C = \frac{A}{1 + \cot \dfrac{B}{2}}$$

SHOP EQUIPMENT NEWS

Brown & Sharpe No. 2 Universal Milling Machine

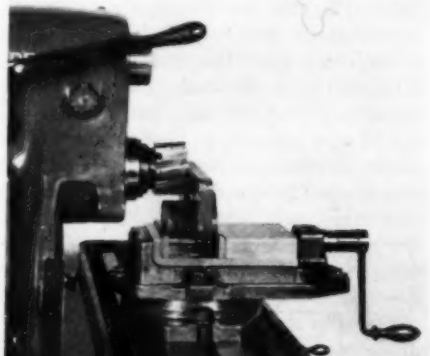
The latest addition to the line of milling machines built by the Brown & Sharpe Manufacturing Co., Providence, R. I., is a light-type No. 2 universal, designed for work of the lighter class and of intentionally simplified construction to permit sensitivity and easy handling while retaining rigidity and accuracy. Spindle height has been lowered to give a more convenient height for vision of cutters and work. The correspondingly lower height of the table affords the easier handling. Capacity of the machine is as follows: longitudinal feed, 28 in.; transverse feed, 10 in., and vertical feed, 15 in., all automatic. Universal spiral index centers swing 10 in. in diameter and take 28 in. in length. Net weight is 2,700 lb., including a 3-hp. motor which is standard equipment.

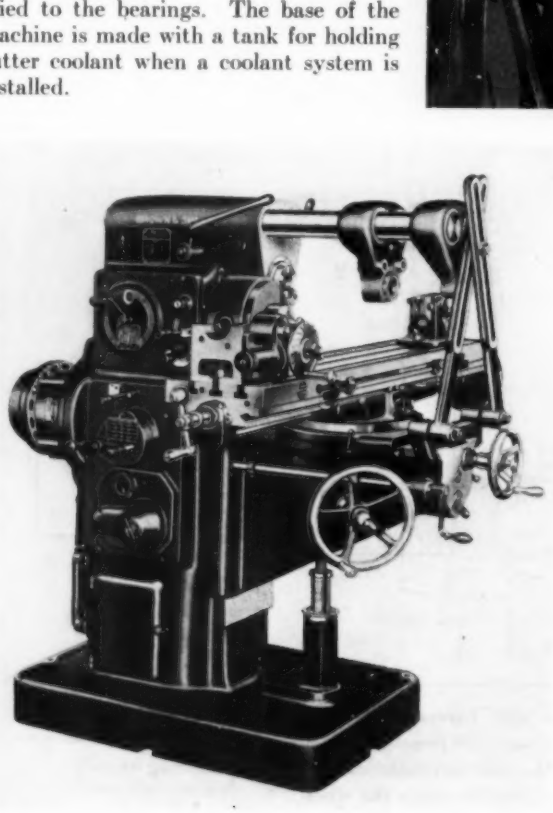
The machine is a completely self-contained, motor-driven type, a flanged motor being employed with the motor pinion meshing with an internal gear on the main driving shaft. The motor runs only when the machine runs and is started by the regular machine starting lever. This lever also serves to apply the brake for quick stopping. All wiring is inclosed in a compartment beneath the motor where it is fully protected but accessible.

Speeds are arranged in two series, giving 16 speeds from 40 to 1,300 r.p.m. Changes are made by rotating a lever on the side of the column in conjunction with a backgear and high and low series lever, one-quarter revolution of the rotating lever giving a change in speed in the series engaged. Single lever feed control is also provided for the 16 feed changes from ½ to 18¼ in. per min., one revolution of the lever giving a change in feed rate. Directional longitudinal feed engagement is provided on the front of the table, in addition to the transverse and vertical feed engagement levers on the side of the knee. Hand adjustments are obtained by the usual handwheels and cranks. A change in the conventional design of column has been made in that the face on which the knee rests is set back approximately 4 in. from the end of the spindle. This construction gives added clearance for the vises, fixtures and work, especially when using end mills, and permits cutters to be set nearer to the spindle nose with the table set at various angles.

Ground tooth gears are used throughout the speed train. Filtered oil is supplied to the bearings. The base of the machine is made with a tank for holding cutter coolant when a coolant system is installed.

Usefulness and operating efficiency of the machine are improved by the use of the universal milling attachment with crane, furnished as an extra. The crane permits easy handling and location of the attachment which has an improved cam lock construction for holding cutters. The wide range of the adjustment of the attachment, together with the speed range of 82 to 2,672 r.p.m., provide means for handling a large variety of work requiring shell end mills from approximately 2¾ in. in diameter to the very small types used in mold and die work. A slotting attachment can be handled by the crane in place of the universal milling attachment if desired. Another feature is the provision for obtaining short leads and fine feeds by the short-lead and feed reducing attachment driven from the table screw. When used without the universal spiral index centers feeds 1/20 of the indicated rate are given for work requiring extremely fine feeds, such as milling with a fly cutter. The attachment also permits





Left—Brown & Sharpe No. 2 Light-Type Universal Milling Machine with automatic feeds as follows: Longitudinal, 28 in.; transverse, 10 in., and vertical 15 in. Above — Showing how the "set-back" column gives added clearance for work or fixtures

obtaining leads 1/20 of normal when geared to the worm of the headstock and also extremely fine leads 1/800 of normal when geared direct to the headstock spindle. These fine leads are obtained with the regular spiral index centers. Other attachments include a vertical milling attachment, 10- and 18-in. hand feed rotary attachments and an 18-in. power feed rotary attachment, which is driven from the table feed shaft.

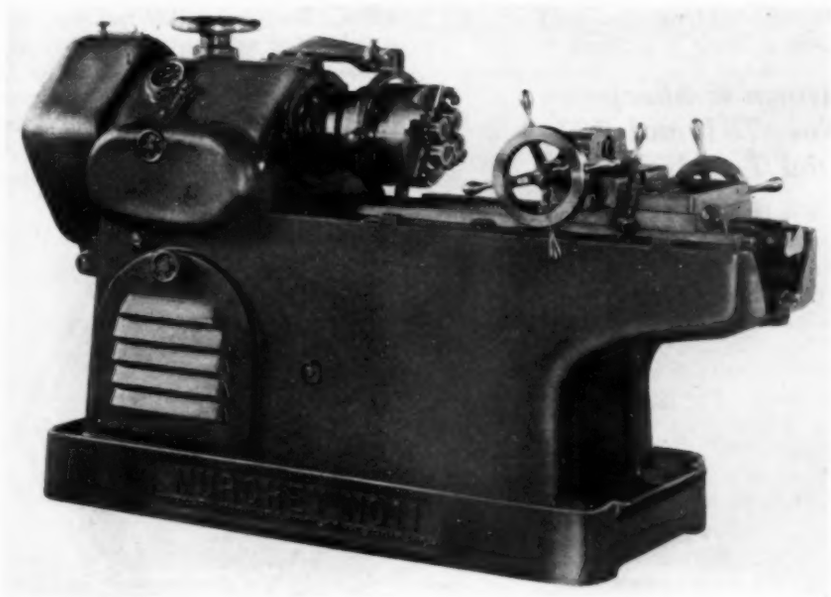
Murchey Nos. 11 and 22 Threading Machines

Either the No. 11 or the No. 22 threading machine offered by the Murchey Machine and Tool Co., Detroit, Mich., can be equipped for bolt and machine threading or for all kinds of pipe threading. The No. 11 has capacity from ¼- to 1-in. machine threads and from ⅛- to ¾-in. pipe threads. It is built in single- or double-head types, and either type can be furnished in two different lengths of bed. One is suitable for nipples, pipe and some classes of bolt threading and the other for threads requiring a longer machine. The No. 22, built only in the two-spindle model, is designed for ¼- to 2-in. pipe threads and from ½- to 2-in. machine and bolt threads.

In both machines the motor is placed in the bed. Speeds are adjustable between 72 and 386 r.p.m. and can be increased or decreased while the motor is running. The spindles are mounted in pre-loaded roller bearings, the spindle wear and chatter is reduced by attaching the dieheads very close to the front spindle bearing. Opening and closing of the dieheads is accomplished by the forward or back movement of the carriage. Levers are arranged to open and close the diehead by hand at any desired point. Dieheads used on machines to thread pipes are of the receding type with inside trip and are arranged to ream and chamfer the pipe while threading. The carriages are operated by handwheel or lever through a rack and pinion, which at the same time closes the diehead. These carriages are taper gibbed and the guides are protected from chips. Vises on the carriage have a horizontal and sidewise adjustment. Both machines are equipped with a gear-type oil pump.

When guaranteed lead accuracy is essential, either the No. 11 or the No. 22 machine may be equipped with a leadscrew. The inclosure of the leadscrew in a steel tube protects it from chips. Adjustable stops are provided for releasing the lead.

The dieheads use circular chasers which are ground in the thread. Chaser holders are set on serrations and are adjustable to the various work diameters required. There is a compensating adjustment on each chaser holder for resharpened chasers. The diehead is equipped with size adjustment to obtain close limits.



"Red Devil" No. 30 Bench Furnace

A three-burner gas bench furnace, designated as No. 30, has been developed by the Red Devil Manufacturing Co., Bellwood, Ill. A pilot light is included, and when the burner valves are opened

the gas is automatically lighted. A temperature of 1,800 deg. F. can be secured in the firebox without a blower. Dimensions: length, 16½ in.; height, 8 in.; width, 7½ in. Firebox size, 6½x6½x5 in. Net weight, 20 lb. Gas consumption, 15 cu.ft. each burner per hour.

"Lincontrol" Device for Arc Welding Machines

With the "Lincontrol" remote-control equipment on a portable arc welder, the operator can work at any distance from the machine and regulate the current accurately. The operator taps the electrode on the work several times and the voltage is raised automatically. A larger number of taps and the voltage is lowered. By tapping the electrode, thus making and breaking the electrical circuit, the current output of the generator is controlled.

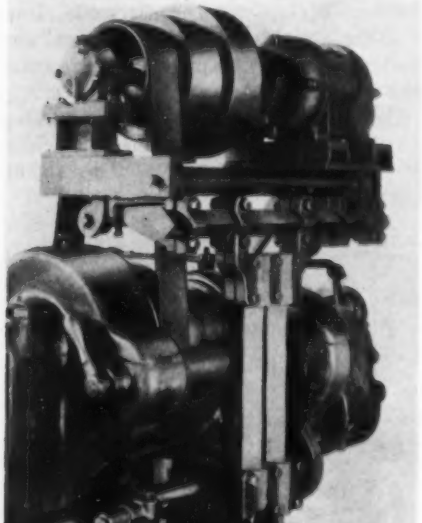
When work is begun in the morning the welder is cold. After the machine is warmed up the current setting should

be changed. Without remote control the operator either uses the original setting with resultant lower speeds or makes a trip to the machine, thereby wasting time. Changing from horizontal to vertical welding or vice versa demands a change in electrode sizes. High quality welds are assured because there is no temptation on the part of the welder to use the original current setting rather than return to the machine and reset the controls. There is also a substantial saving in time wherever the welding is done at a distance from the machine, as in the case of shipyard and structural work, boiler and tank shops, and other applications.

The Lincontrol is built by the Lincoln Electric Co., Cleveland, Ohio, and is offered as optional equipment with the company's "Shielded Arc" welders, or may be purchased separately and installed on motor-driven, belt-driven or gasoline-engine welders now in use. The mechanism is incased in a small box which may be quickly attached to the welder voltage control. No additional cables or rheostats are required.

"Production" Type 844 Motorized Countershaft

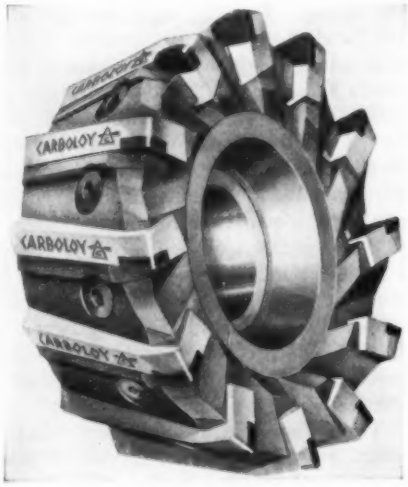
The Production Engineering Co., 5219 Chester Ave., Cleveland, Ohio, is now offering Type 844 motorized countershaft for motorizing machine tools. The unit is built with anti-friction bearings throughout and it is easily installed. Four bolts and a short belt cover the necessary requirements. The drive is complete with a ball-bearing motor and reversing drum switch ready for mounting on the machine.



The accompanying illustration shows a drive on a screw machine, looking at the machine from the rear. The column for the drive is bolted to a flat surface on the machine. This column is adjustable sideways over a wide range.

Carboloy General-Purpose Milling Cutter

The Carboloy Company, Inc., 2489 East Grand Blvd., Detroit, Mich., is marketing a general-purpose face-milling cutter for universal use on cast iron, non-ferrous and non-metallic materials. Heretofore, the economical use of Carboloy milling cutters has been confined

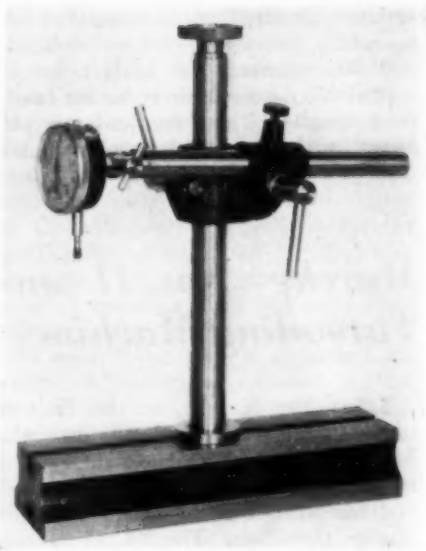


largely to quantity production jobs, but this general-purpose cutter is intended for economical use on short run, diversified milling jobs as well. It is possible to use the standard Carboloy cutter interchangeably on various milling jobs in the same manner as a high-speed steel cutter.

Brown & Sharpe Nos. 731 and 731-A Dial Test Indicators

The Brown & Sharpe Mfg. Co., Providence, R. I., now has available No. 731 and No. 731-A dial test indicators which afford greater rigidity and accuracy in dial reading by using an upright and a dial-holding rod of larger diameter. These members are made tubular for lightness. Lever-type clamps for making adjustments have also been improved. The base of both indicators is 10 in. long by 3 in. wide.

The No. 731 indicator is furnished with a dial graduated to 0.001 in. and a spindle movement of 0.300 in. The No. 731-A is recommended for uses



where a higher degree of accuracy is required. It is furnished with a dial graduated to 0.0001 in., has jewel bearings, and the movement of the spindle is 0.020 in. Straight and angular stops adapting the indicator for use on lathe beds and machine tables are furnished as extras.

"Hold-Heet" Pyrometers

The Russell Electric Co., 352 West Huron St., Chicago, Ill., has developed a "Hold-Heat" pyrometer, an inexpensive instrument for factory installation on heat-treating and oven equipment. The instrument is designed for comparatively large current flow, and thus enables a steady movement, together with strong control springs, that makes the meter practically dead-beat. Different thermocouples used with the instrument have nearly the same electrical resistances. Because of this fact the meter is calibrated with an external resistance to equal the average resistance of the different thermocouples. No connection leads are employed, and the No. 6 gage thermocouple extends direct from the meter to the point where temperatures are to be measured.

Atlas Bench and Floor-Type Sensitve Drills

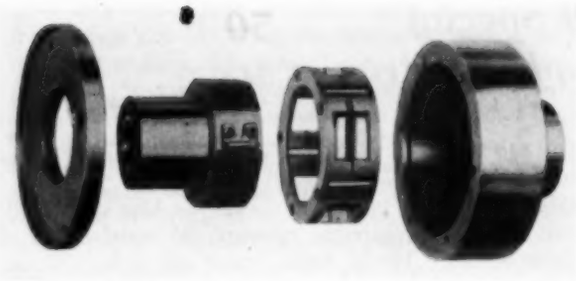
The Atlas Press Co., Kalamazoo, Mich., is building a line of four drill presses, three bench models and one floor type. Special attention has been paid to bearing construction. The two larger sizes of machines have four bearings in the head, two large SKF bearings at the top and two SKF bearings in the quill. The second or medium

size, has three such bearings in the head, while the smallest size is constructed with oilless bearings. All machines may be driven with either a ¼- or ⅓-hp. motor.

The No. 60 drill illustrated has 9 speeds from 600 to 2,500 r.p.m. The height is 40 in., and the maximum distance from the base table to the chuck jaws is 19 in. Maximum distance from the table to the chuck jaws is 13 in. The ground steel tubing support is ¾ in. in diameter, overall width of machine, 10 in., overall depth with motor, 28 in., and the shipping weight, 115 lb.

Hilliard Over-Running Clutch

The Hilliard Corp., Elmira, N. Y., is offering an over-running or free-wheeling clutch for the following applications: on single drives to a load with high inertia to prevent breaking of transmission chain or belt when shutting down; on multiple-speed drives to prevent backlash or shock when speed is changed, and as a ratchet drive. The ratings range from ¼ hp. to 100 hp. at 100 r.p.m.



Components of the Hilliard Over-Running Clutch

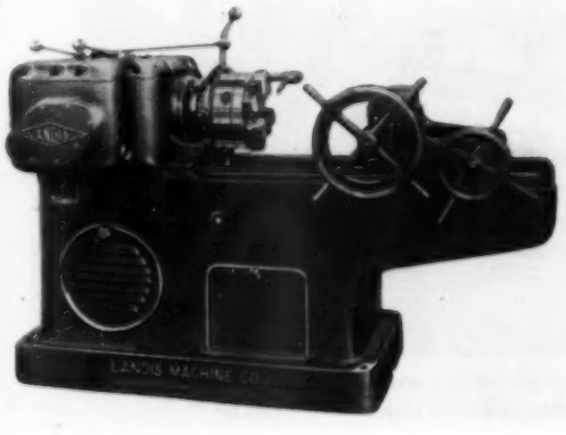
The principle of operation is that a roller running between an outer ring and an inner flat surface will drive between the outer and inner members when rotation is in one direction, and release or run free when rotation is reversed or one member runs ahead of the other. As shown by the accompanying illustration, the rollers are held in a bronze cage which is kept in position by a small bracket on one face of the hub. The rollers bear only on every other flat surface and the bearing point is at one side of the center of the flat. These rollers also engage the ring pressed into the outer sleeve. Any wear that occurs takes place on the flat surfaces. These may be renewed four times without requiring new parts, by moving the cage to new positions on the center hub.

The unit may be used either as a clutch or as coupling. The drive may be applied either through the outer sleeve or the inner hub. A gear, sprocket, or pulley may be mounted on the sleeve.

"Landmaco" 2- and 2½-In. Threading Machines

The Landis Machine Co., Inc., Waynesboro, Pa., is now offering the "Landmaco" threading machine in 2- and 2½-in. sizes. This machine was formerly built only in the 1- and 1½-in. sizes. Capacities of the new models are, respectively, ½ to 2 in. and ½ to 2½ in. Both are made in the single- and double-head types. Leadscrew attachments can be supplied for both sizes and models.

The larger machines are patterned after the smaller types previously marketed and have the same features of design, including geared headstock with chrome-nickel steel gears, spiral-bevel-gear spindle drive, anti-friction shaft and spindle bearings, built-in reversible coolant pump, friction clutch control, double-wall bed, and covered guides. All controls are centralized.



"Landmaco" Threading Machines are now built in 2- and 2½-in. sizes besides the 1- and 1½-in. sizes previously introduced

Dumore Model 8-HG Hand Grinder

The Dumore Co., Racine, Wis., has announced a light-weight, high-speed hand grinder for use in pattern, machine and engraving shops, and in toolrooms. Known as the Model 8-HG, the grinder weighs only 1 lb. 10 oz., and is balanced so that it can be held in the hand and used like a pencil. A 1/40-hp. Dumore universal motor drives the tool at 15,000 r.p.m. Regular equipment includes a special ⅛-in. chuck, toggle switch, rubber-covered cord, plug and three grinding wheels on shanks.

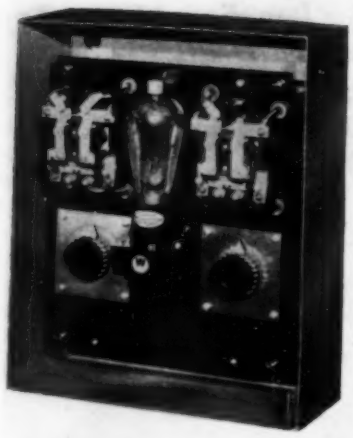
Schatz No. 650 Special Inclinable Automatic Press

Variable speeds of 70, 90, 140 and 180 strokes per min. can be obtained from the No. 650 special inclinable press offered by the Schatz Manufacturing Co., Poughkeepsie, N. Y. The feeding devices are of interest. Strips are stacked on the feeding table, which is also inclinable with the press, and a vacuum apparatus automatically feeds the strips to the machine. The feeding table is raised mechanically to compensate for the decrease of the height of the strip pile. The strip is gripped by a double-sided precision feed which in this size of machine has a stroke adjustment of 0 to 4 in., and takes strips up to 5⅛ in. wide.

The feeding apparatus on the bed consists of four grips, two outside grips that slide back and forth, and two inside grips that open and close in synchronism with the two outer grips and hold the material while it is being punched. The two outer grips are driven by a rotating disk when the fine adjustment for length of feed is required. A patent strip gage is applied against which the strip is pushed before entering the grip so that part punchings are eliminated.

A battery of such machines can be served by one operator. Should it be desirable to feed coiled material from a reel, the strip table can be removed. Drive of the machine is through an adjustable, multiple-disk clutch with brake, permitting single or continuous strokes. A reversible multi-speed motor is employed.

Specifications for machine illustrated: maximum pressure, 45 tons; depth of throat from center of slide, 7⅞ in.; distance between slide and bed, stroke up, adjustment up, 12¾ in.; stroke adjustment, ⅛ to 2⅜ in.; area of slide, 8½x7 in., power required, 5 hp.



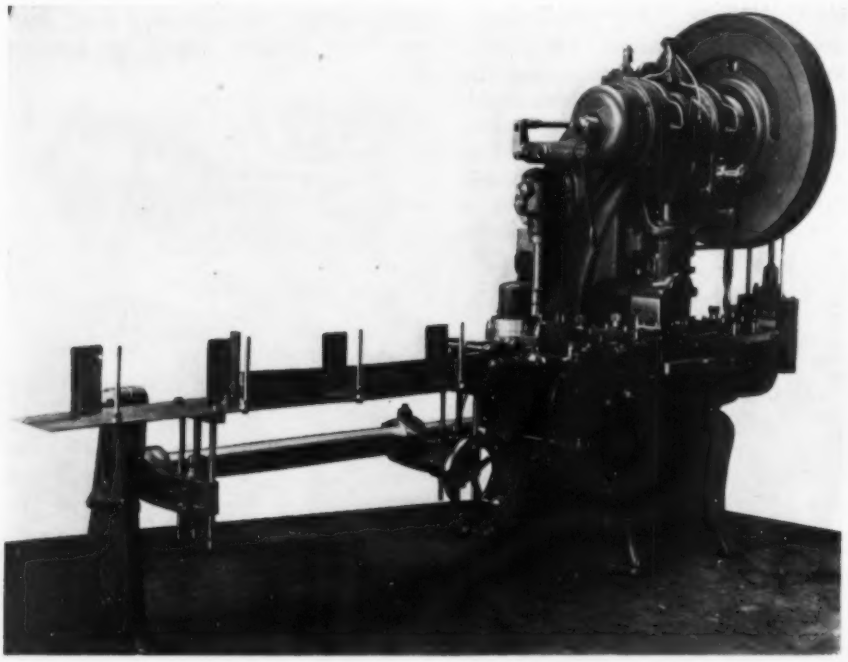
Westinghouse Type HA Electronic Timer

For use in connection with such operations as timing of current flow on spot and projection welders, the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has announced a Type HA electronic timer which measures a pre-set length of time and closes or opens its contact for that time after the initiating impulse is given by a pushbutton, treadle or cam-operated switch. The time measured is continuously adjustable from 1/10 sec. to 45 sec. The device can be applied to any spot or projection welding machine now in service which is equipped with a magnetic main contactor.

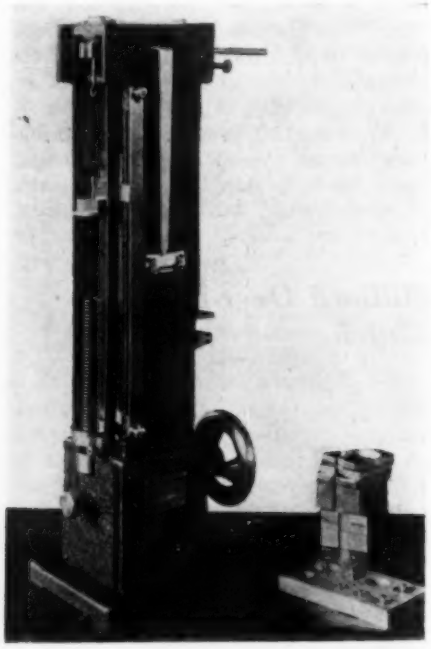
An industrial-type grid-glow tube operates the contactor directly without the use of delicate intermediate relays. For applications requiring a higher accuracy, such as welding, provisions can be made to eliminate entirely the errors inherent in the closure of the contactors. This is done by the use of an auxiliary contact on the main contactor, arranged so that the timing is started from the instant the contactor closes instead of when the control switch is closed. The contact capacity is 10 amp. at 115 volts and 5 amp. at 220 volts, a.c.

Elasticometer Type RS-5 Spring Testing Machine

Rapid and accurate examination of light springs is the function of the Type RS-5 spring testing machine announced by the Coats Machine Tool Co., Inc., 110-112 West 40th St., New York, N. Y. This machine supersedes the former Type RS-2, and is used preferably for static tests. To this end it combines a tensioning device with a scale for "weighing" the spring load and a gradu-



As the height of the strip pile decreases, the feeding table is raised mechanically



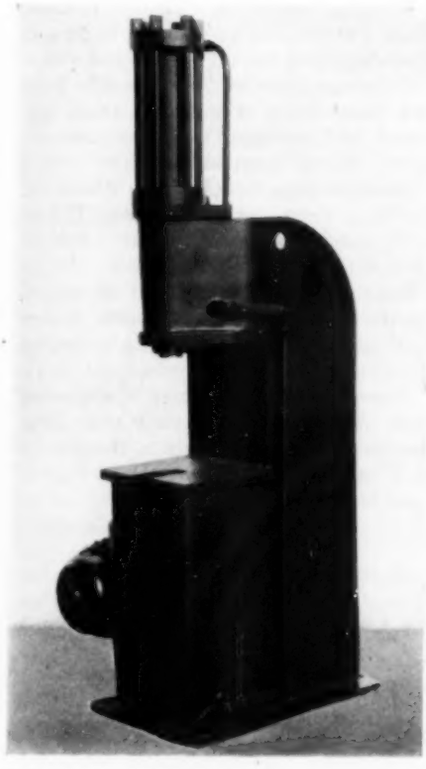
ated vertical length scale for measuring spring length. The drive consists of a handwheel-operated rack and pinion. Attached to the rack are the upper compression plate, the lower tension hook and the pointer for indicating spring length. The pointer is provided with a vernier. Stroke of the rack may be set to automatic stops in either direction for speeding up quantity inspection. The weigher scale consists of a single 1 to 1 beam.

Specifications: Maximum free length of compression springs, 12 in.; maximum extended length of extension springs, 12 in.; total height, 23 in.; weight, 46 lb., diameter of compression plate, 1¾ in. The machine is built for a normal load of 5 lb., but may be furnished for loads up to 12½ lb.

Fox Hydraulic Press

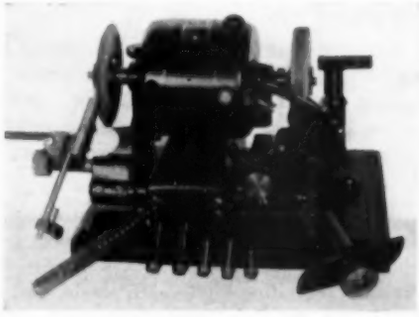
Hydraulic power presses are now being built by the Fox Machine Co., Jackson, Mich. Illustrated is an 8-ton model with a "C" type frame. In addition to the table height shown, low tables are offered. With the low tables and with various filler blocks, the presses are capable of receiving a large variety of work.

Frames are made of hot-rolled steel plates, welded and annealed. Although the presses are offered in standard dimensions, this method of fabrication makes it possible to furnish presses with special dimensions. Vickers pumps are used with either foot or hand control for the ram action. When the ram is in its upper position, which can be at any point on the stroke, the pump delivery is by-passed. A fast traverse can be had, and full tonnage at slow ram speed is available. The reservoir and pump are mounted within the frame. The company is prepared to design and build fixtures for assembling, straightening and similar operations on the presses.



Wells No. 10 Drill Sharpener

A No. 10 machine for sharpening drills from No. 60 to ¼ in., has been added to its line by the Wells Manufacturing Co., P. O. Box 613, Greenfield, Mass. This machine sharpens the drill on the right side and thins the web on the left side. The drill is held in a double-end collet. In turn, the collet is held in a quill that has two cams, one for throw and one for thrust. Grinding is done by revolving the drill in the quill. A diamond dresser and holder are furnished. Wheel diameter is 4 in., and motor is of 1/20 hp.



• TRADE • PUBLICATIONS

CHAINS. A book entitled "Chains and Sprockets for Power Transmission, Conveying and Elevating" has been published by the Baldwin-Duckworth Chain Corp., Springfield, Mass. In addition to catalog descriptions of regular and special chains produced, the book contains engineering information.

COUPLINGS. A description of the "Falk-Rawson" 4-duty coupling is contained in Bulletin No. 501 issued by The Falk Corporation, Milwaukee, Wis. Prices, ratings and dimensions are included.

FITTINGS—The Taylor Forge & Pipe Works, P.O. Box 485, Chicago, Ill., has issued catalog No. 31-1 on seamless steel fittings for pipe welding, giving prices, dimensions and weights of the various fittings available, pressure-temperature ratings and dimensions.

FURNACES. Bulletin No. HD-334 on various types of industrial and laboratory furnaces is available from the Hevi Duty Electric Co., Milwaukee, Wis.

GAGES. A loose-leaf gage manual containing data on visual and electric gages, common gage terminology, plug and ring gages, adjustable-limit plug and snap gages, is being distributed by the Sheffield Machine & Tool Co., Dayton,, Ohio.

GEAR MATERIAL. The Spaulding Fibre Co., Inc., Tonawanda, N. Y., has issued a circular on its lanfinated "Spauldite" gear stock, listing grades, physical characteristics. Blanks and sheets only are furnished.

ELECTRIC HEATING UNITS AND DEVICES. Catalog GEA-1520B, superseding 1520A, has been compiled by the General Electric Co., Schenectady, N. Y., on all types of electric heating devices and units. Complete specifications and much engineering information concerning applications and installation are included.

LEATHER BELTING. "Evolution of Leather Belting" is the title of a short illustrated brochure published by the Charles A. Schieren Co., 30 Ferry St., New York, N. Y. The booklet presents historical data on the early uses of belts and traces the growth of the company and its contributions to the leather belting industry.

MACHINERY. New and used machinery for sale by the Morris Machinery Co., Inc., 81-115 Chestnut St., Newark, N. J., is shown in Bulletin No. 110.

MOTORS—Form 3085, available from the Emerson Electric Mfg. Co., 2418 Washington Ave., St. Louis, Mo., describes the company's split-phase motors in 1/6 and ¼ hp., 1725 r.p.m., and ⅛ and 1/6 hp., 1,140 r.p.m.

MOTORS. Leaflet 20609, issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., shows Type CR single-phase, repulsion-start induction motors in sizes from ¾ to 3 hp.

MOTORS. Leaflet 20613, entitled "Quiet Operating Motors," may be obtained from the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

PAINT FAILURE—A bulletin "A Common Cause of Paint Failure and its Scientific Prevention" is the title of a bulletin available from the Parker Rust-Proof Company, Detroit, Mich. It shows the importance of the formation of alkali on iron or steel with respect

to its effect on the maintenance of the paint film.

POWER-FACTOR CORRECTION. Bulletin GEA-77F issued by the General Electric Co., Schenectady, N. Y., shows various types of equipment for improving the power factor in industrial plants.

PUMPS. Bulletin No. 10, distributed by the Tomkins-Johnson Co., Jackson, Mich., describes the "Brownie" coolant pump.

SHARPENING STONES. Behr-Manning Corp., a division of Norton Co., Troy, N. Y., has issued the 16th edition of its reference book "How to Sharpen" giving information on the selection, use and care of sharpening stones.

SPARK TEST FOR STEELS. Research Paper RP605 "The Utility of the Spark Test as Applied to Commercial Steels," has been issued by the United States Department of Commerce, Bureau of Standards. The booklet is available from the United States Government Printing Office, Washington, D. C., for 5 cents.

STEEL CHART. A finely printed wall chart, 21¼ in. x 23 in., is available from the Wyckoff Drawn Steel Co., Ambridge, Pa. This chart shows relative machinability of various steels and characteristics with respect to cold forming, carbonizing, machining and hardening, and heat-treating for strength and toughness. Other matter consists of conversion tables for the various hardness scales, weights of round, square and hexagon bars, and specifications for SAE automotive steels.

TAPS. The Landis Machine Co., Waynesboro, Pa., has published two bulletins on collapsible taps: Bulletin No. G-83 on the Style LT taps for straight threads, and Bulletin No. G-81 on the Style LM receding chaser taps for tapered threads.

THERMIT WELDING. The permanency of Thermit repairs and actual cost data for a number of jobs are shown in a booklet "Thermit Welding—Industry's Master Maintenance Tool," issued by the Metal & Thermit Corp., 120 Broadway, New York, N. Y.

THERMOMETERS. Catalog 9001, containing 32 pages, features resistance thermometers for measuring temperatures from —300 deg. to +1,000 deg. F., and available in indicating, recording and controlling types. The catalog is available from the Brown Instrument Company, Philadelphia, Pa.

TIMESTARTERS. Leaflet 20591, by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., shows a line of low-maintenance starters for remote control of constant- and adjustable-speed d.c. motors in sizes up to 10 hp., 115 volts and 20 hp., 230-550 volts.

"THE JOB AHEAD FOR MACHINERY." Booklet No. 6 in a series published by the Farrel-Birmingham Co., Ansonia, Conn., is entitled "The Job Ahead for Machinery" which states that a survey of economic trends and analyses of employment for 30 years of increasing machine productivity show that there is no basis for the contention that the machine is reducing the number of jobs available. The booklet emphasizes that the relief of unemployment can only be accomplished by removal of the obstacles that are restricting the flow of long-term capital into productive facilities.

WELDING. A series of 28 lessons in arc welding, consisting of some 60 mimeographed pages, and illustrated by sketches, are available from the Lincoln Electric Co., P. O. Box 683, Cleveland, Ohio. The price is 50 cents, domestic postage prepaid, and 25 cents extra for foreign postage.

WELDING EQUIPMENT. Leaflet 20615, published by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., describes spot and projection welding equipment for manual or motor operation.

WIRE PRODUCTS. The Firth-Sterling Steel Co., McKeesport, Pa., has issued a folder on the products of its Globe Wire Division, including high-speed steels, tool steels and stainless steels in bars, rods and wire.

• PATENTS •

APRIL 3, 1934

Metal-Working Machinery

Driving Device for the Charging Slide in Friction Wheel Spindle Presses. Alfred Franke, Oberlind-Sonneberg, Germany, assigned to Maschinenfabrik vorm. Georg Dorst A. G., Oberlind-Sonneberg, Germany. Patent 1,953,218.

Forging Machine. Fredrich J. Rode, Chicago, Ill., assigned to Marquette Tool & Mfg. Co. Patent 1,953,314.

Mechanical Riveting Machine. Allan A. Norin, Chicago, Ill., assigned to Norin Engineering Co. Patent 1,953,-719.

Apparatus for Making Pressed Metal Articles. Hermann M. Hassenbruch, Wynnewood, Pa., assigned to Nicetown Manufacturing Co. Patent 1,953,757.

Tools and Attachments

Construction of Grinders for Use in Lathes or the Like. Emil Ritz, Jr., Mount Healthy, Ohio, assigned to the Hisey-Wolf Machine Co. Patent 1,953,-133.

Device for Sharpening Reamers. Kurt Bley, Magdeburg, Germany. Patent 1,953,212.

Speed Control Means for Metal Forming Machines and the Like. Jacob A. Hollander, Forest Park, Ill., assigned to Allen J. Cline. Patent 1,953,230.

Chaser. Ernest T. Bysshe and Robert R. Finn., Springfield, Vt., assigned to Jones & Lamson Machine Co. Patent 1,953,528.

Automatic Die. Ernest T. Bysshe and Robert R. Finn., Springfield, Vt., assigned to Jones & Lamson Machine Co. Patent 1,953,529.

Chuck. Hinman L. Smith, Plainville, and Austin L. Stowell, New Britain, Conn., assigned to The Stanley Works. Patent 1,953,637.

Drill Chuck. Robert H. Park, Seattle, Wash. Patent 1,953,830.

APRIL 10, 1934

Metal-Working Machinery

Machine for Forming Metal. Theodore M. Hiester, Dayton, Ohio, assigned to United Aircraft Products, Inc. Patent 1,953,934.

Clutch Operating Mechanism for Machine Tool Feed Control Devices. Howard W. Hunt, Cincinnati, Ohio, assigned to The G. A. Gray Co. Patent 1,954,079.

Drop Hammer. Frank J. Vlchek, Cleveland, Ohio, assigned to the Vlchek Tool Co. Patents 1,954,155, 1,954,156 and 1,954,157.

Drop Hammer. John C. Wattleworth, Cleveland, Ohio, assigned to the Vlchek Tool Co. Patent 1,954,159.

Welding Apparatus. Henry Thomas Platz, Detroit, Mich., assigned to Briggs Manufacturing Co. Patent 1,954,426.

Grinding Machine. Albert H. Dall and Hans Ernst, Cincinnati, Ohio, assigned to Cincinnati Grinders Incorporated. Patent 1,954,442.

Machine Frame. Cortis F. Sherman, Hartford, Conn., assigned to the Henry & Wright Manufacturing Co. Patent 1,954,651.

Power Press. Cortis F. Sherman, Hartford, Conn., assigned to the Henry & Wright Manufacturing Co. Patent 1,954,652.

Power Press. Frank K. Simmons, West Hartford, and Cortis F. Sherman, Hartford, Conn., assigned to the Henry & Wright Manufacturing Co. Patent 1,954,653.

Tools and Attachments

Work Holding Clamp and Drill Jig. Henry W. Mass, Rochester, N. Y. Patent 1,954,708.

Processes

Method of Producing Gears. Nikola Trbojevich, Detroit, Mich., assigned to Gleason Works. Patent 1,954,504.